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## TECHNICAL MANUAL

OPERATOR, ORGANIZATIONAL, DIRECT SUPPORT,  
GENERAL SUPPORT, AND DEPOT  
MAINTENANCE MANUAL

### RADIO SET GROUP

OA-6988/MRC-85(V)1

AND

### RADIO SET GROUP

OA-7007/MRC-85(V)2

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NG: None

USAR: None

For explanation of abbreviations used, see AR 310-50.





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## CHAPTER 1

### GENERAL INFORMATION

#### 1-A.1. SCOPE

a. This manual describes Radio Set Groups OA-6988/MRC-85(V)1 and OA-7007/MRC-85 (V)2. It includes installation and operation instructions and covers operator, organizational, direct support (DS), general support (GS), and depot maintenance.

b. A basic issue items list appears as Appendix B, and a maintenance allocation chart appears as Appendix C.

Note: Appendixes B and C are current as of June 1971.

#### 1-A.2. INDEXES OF PUBLICATIONS

a. Refer to the latest issue of PA Pam 310-4 to determine whether there are new editions, changes, or additional publications pertaining to this equipment.

b. Refer to the latest issue of PA Pam 310-7 to determine whether there are current, applicable modification work orders (MWO's) pertaining to this equipment.

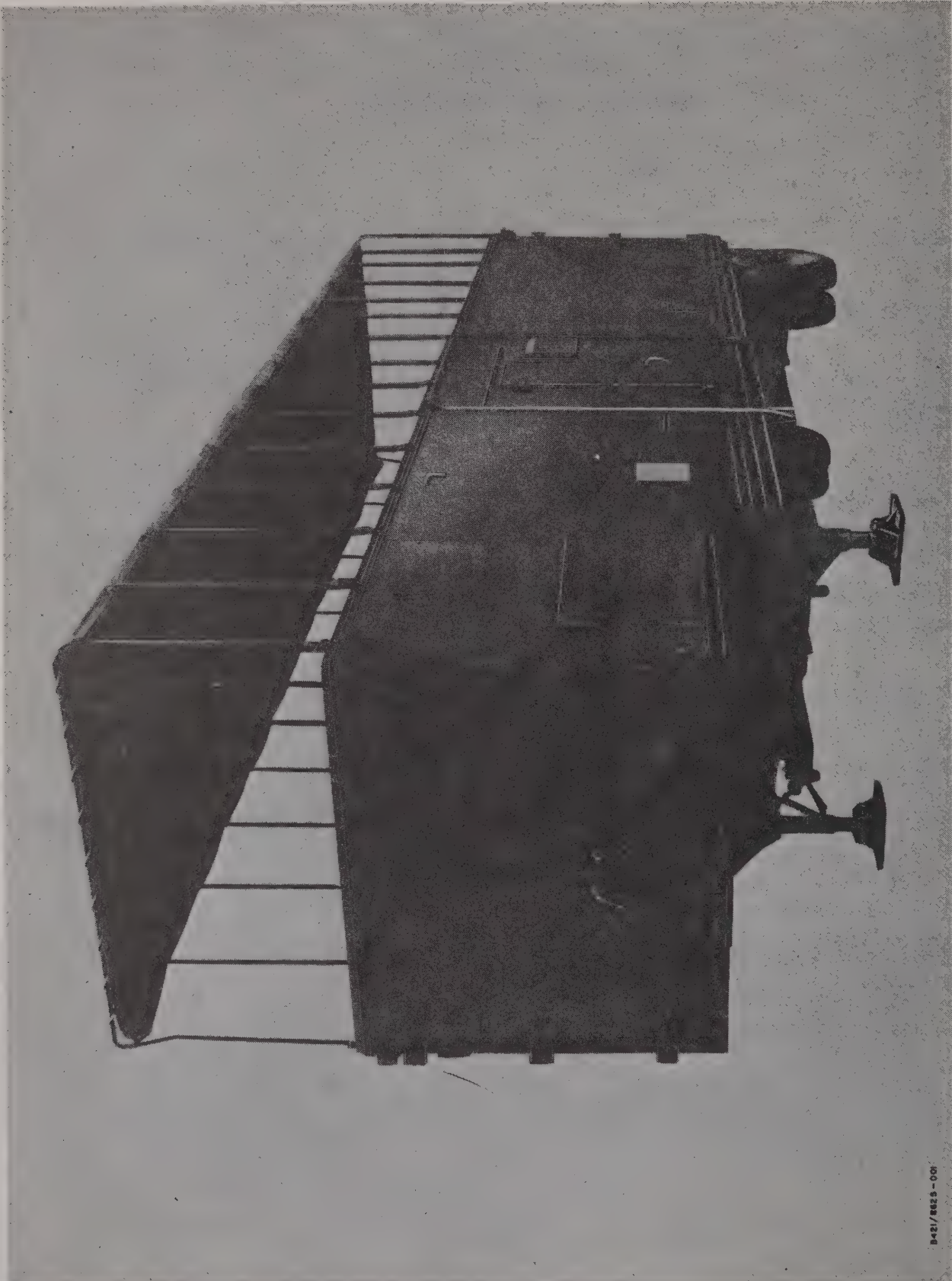
#### 1-A.3. FORMS AND RECORDS

a. Report of Maintenance and Unsatisfactory Equipment. Use equipment forms and records in accordance with instructions in TM 38-750.

b. Reports of Packaging and Handling Deficiencies. Fill out and forward DD Form 6 (Report of Packaging and Handling Deficiencies) as prescribed in AR-700-58 (Army), NAVSUP Publications 378 (Navy), AFR 71-4 (Air Force) and MCO P4610-5 (Marine Corps).

c. Discrepancy in Shipment (DISREP) (SF361). Fill out and forward Discrepancy in Shipment Report (DISREP) (SF361) as prescribed in AR 55-38 (Army), NAVSUP Pub 459 (Navy), AFM 75-34 (Air Force) and MCO P4610.19 (Marine Corps).

d. Reporting of Equipment Manual Improvement. Report of errors, omissions, and recommendations for improving by the individual user is encouraged. Reports should be submitted on DA Form 2028 (Recommended changes to Publications) and forwarded direct to: Commanding General, U.S. Army Electronics Command, ATTN: AMSEL-ME-NMP-EM, Fort Monmouth, New Jersey 07703.



3421/8825-001

Figure 1-1. Power Amplifier Van



## 1-1. DESCRIPTION.

### 1-2. GENERAL.

1-3. Radio Set Group OA-6988/MRC-85(V)1 and Radio Set Group OA-7007/MRC-85(V)2, hereinafter referred to as the power amplifier van (fig. 1-1) is part of an AN/MRC-85 type radio set (fig. 1-2), which also includes a diesel generator van and an operations van.

1-4. The power amplifier van is a modified U.S. Army Ordnance Type M373A2 semitrailer that contains electronic and electromechanical equipment. The following paragraphs describe the power amplifier van.

### 1-5. DESCRIPTION OF VAN EXTERIOR.

1-6. Figure 1-3 (sheets 1 and 2) shows typical exterior roadside and curbside views of the power amplifier van.

1-7. The rear of the van is supported by a single axle assembly with dual 10.00 X 20, 10 ply tires (14). A wheel splash guard (commonly called mudguard) (50) is mounted at the rear of each set of dual tires. Each mud guard is of sufficient width to cover its respective tire and functions to reduce both back and side spray when the van is towed overland.

1-8. The van may be connected to a towing vehicle by a king pin assembly which is located at the front of the van. When towed, the van is supported at the front by the upper fifth wheel plate on the towing vehicle. The SERVICE (30) and EMERGENCY (33) hose couplings at the rear of the power amplifier van provide connections for an air brake system between the towing vehicle and the van.

1-9. Four lifting eyes (22), located on each side of the van, facilitate lifting the van by an

overhead hoist; the eyes are recessed when not in use. Tiedown sockets (17), located around the rim of the van under the rubrail (15), are used to secure the van during shipment. A pintle hook (57), located at the lower rear of the van, may be used for towing an additional trailer.

1-10. Warning indicators for adjacent traffic during land transport are provided by ruby reflectors (53 and 59) on the rear wall, ruby reflectors (11 and 51) on the rear roadside and curbside walls, and by amber reflectors (44 and 28) at the front curbside and roadside walls, respectively.

1-11. Provision is made for adjusting the height of each corner of the van for leveling purposes. Adjustment is effected by lowering or raising two retractable supports (23) (commonly referred to as landing gears) at the front and two leveling jacks (12) at the rear of the van. Landing gear instruction plates (25 and 45) are located adjacent to each landing gear. The landing gears are secured in a vertical position after the height is adjusted. Each leveling jack and landing gear is supported by individual shoes (13 and 24). The shoes are stored under the van when not in use. During transport of the van, the leveling jacks are swung up under the van and secured in this position.

1-12. Bench levels (32 and 48) are located on the exterior lower front and forward curbside of the van and are used during the leveling operation.

1-13. The van is equipped with double doors (34, 36, and 41) in the front, rear, and curbside walls. A single door (20) is located on the roadside wall of the van. A covered decontamination port (47) is located in the front curbside doorway.

1-14. Two air intake vents and a louvre (26, 49, and 27) and two exhaust vents with a screen

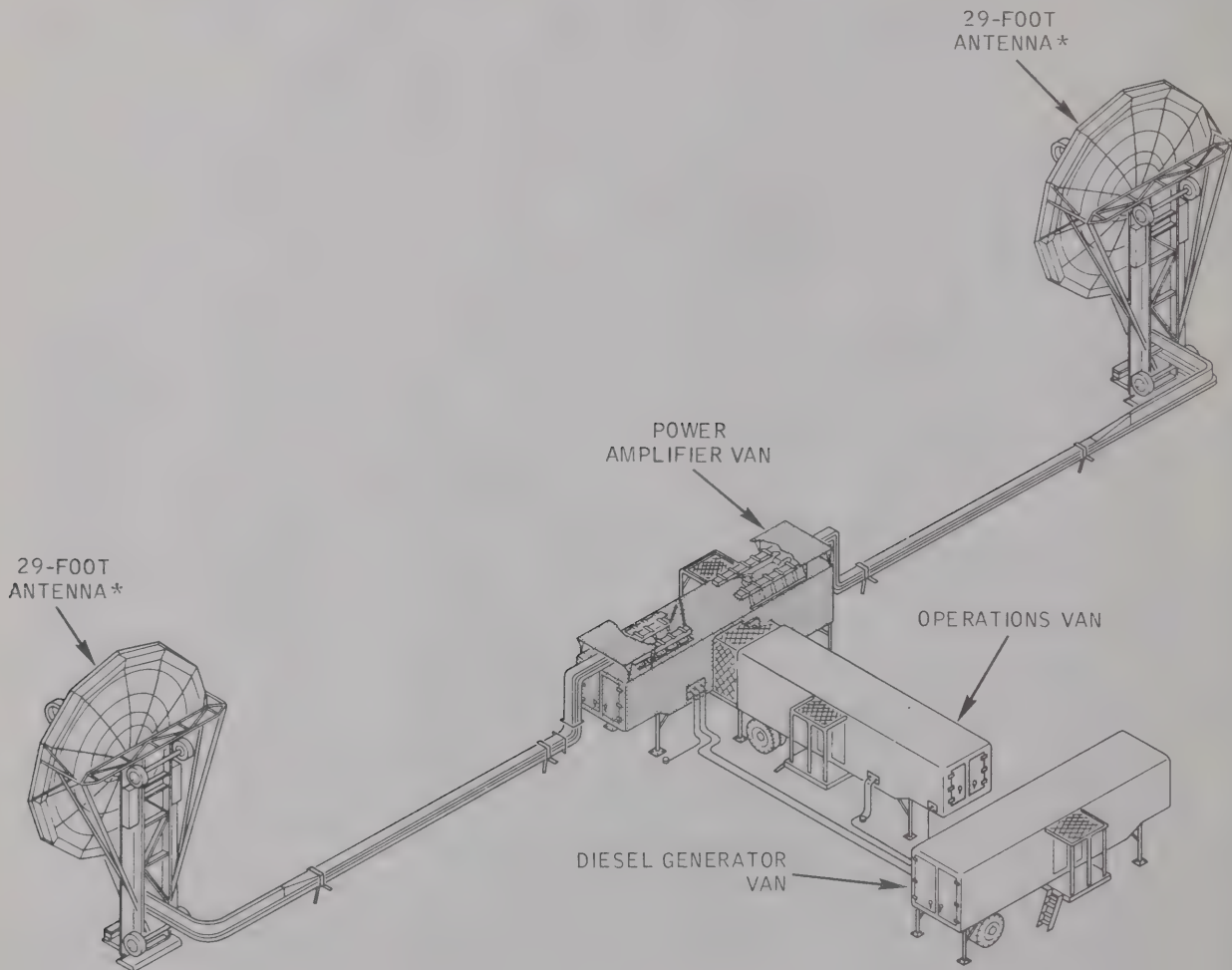
(4, 38, and 3) are located in the front roadside and rear curbside walls of the van. These vents enable cooling of the two heat exchangers located at either end of the van. Air conditioning supply (8) and return ducts (7) are located above the roadside door; dust covers are provided for the duct ports during transport.

1-15. Passageway (9) and vestibule frames (42) are mounted around the roadside and curbside doors to permit attachment of vestibule enclosures.

1-16. In extremely cold areas, an arctic heater is used to maintain proper ambient temperature

within the van. The arctic heater is connected to the inlet port (16), with cover, in the roadside wall. The arctic heater exhaust port (46), with cover, is located in the curbside wall. These ports are covered when not in use.

1-17. Six folding steps (52), mounted on the rear roadside wall, permit access to the roof of the van. An electrical connector (31) on the lower front wall of the van facilitates connection of the 24-volt electrical power system in the towing vehicle to the van for operation of stop lights (54 and 58), tail light (55), and running lights (1); an auxiliary connector (56) on the lower rear of the van is used to pro-



\*USED WITH RADIO SETS AN/MRC-85(V) 1 AND AN/MRC-85(V)2. 60-FOOT ANTENNA USED WITH RADIO SET AN/MRC-85A(V) NOT SHOWN

Figure 1-2. Radio Set AN/MRC-85(V)



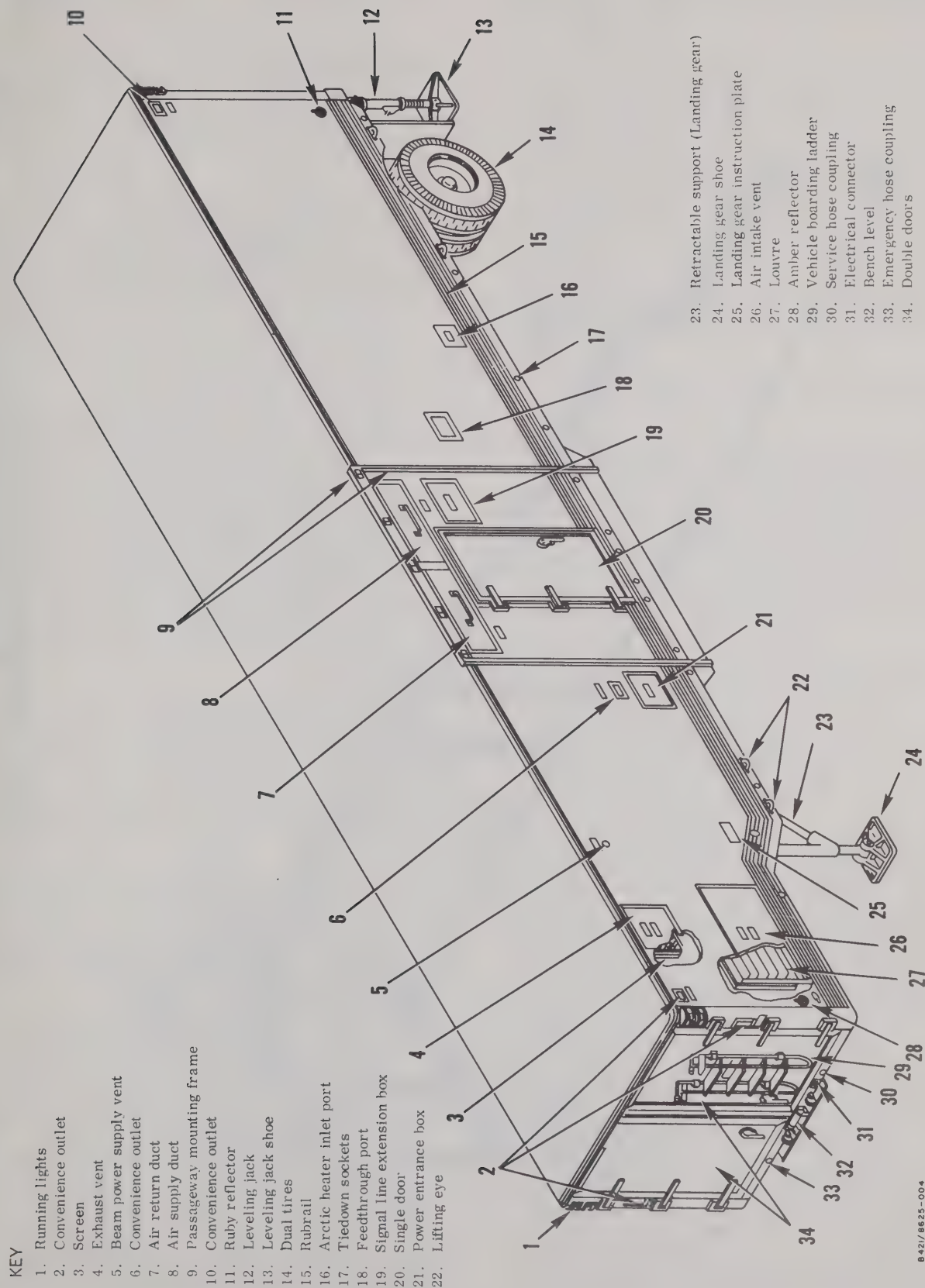


Figure 1-3. Van Exterior View (Sheet 1 of 2)

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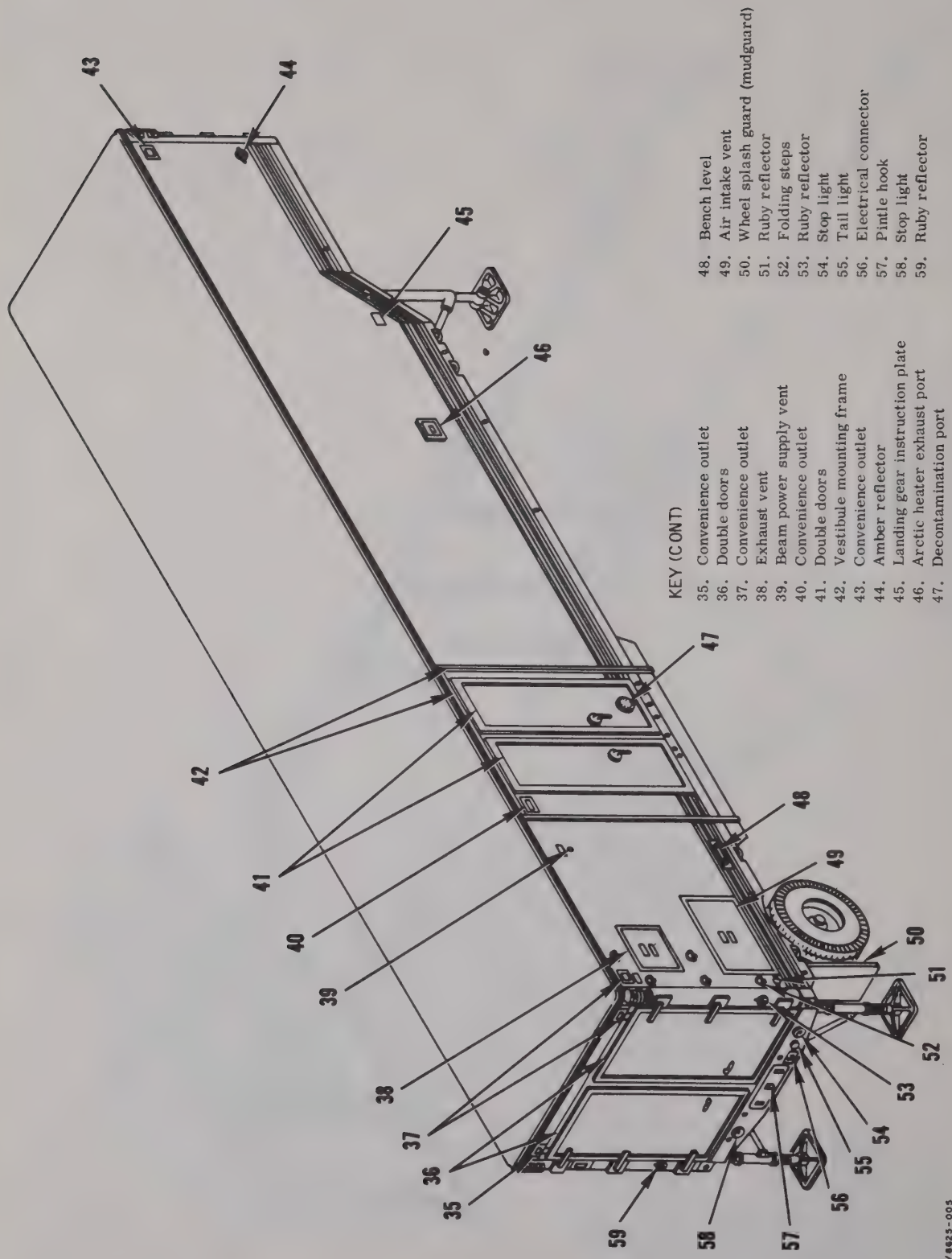


Figure 1-3. Van Exterior View (Sheet 2 of 2)

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vide electrical power to an additional trailer, as required.

1-18. Ten weatherproof duplex convenience outlets (2, 6, 10, 35, 37, 40, and 43) are located on the exterior front, rear, roadside, and curbside walls of the van. These outlets supply 115-volt, 60-cycle, single-phase electrical power.

1-19. The power entrance box (21) is located in the lower part of the roadside wall, to the left of the single door. A hinged cover, held by turnlock fasteners, protects the box during transport of the van. The power entrance box consists of a metal cabinet containing four connectors on the front cover and a bushing at the top. Two lower connectors provide a means of applying external power to the power amplifier van (by cables to the power output box in the diesel generator van). The upper connectors may be used to supply power to antenna deicers. The bushing secures the cables to the circuit breaker boxes. Signal cables (linking the power amplifier and operations vans) are connected to the signal line extension box (19), located in the roadside wall to the right of the single door. A hinged cover, held with turnlock fasteners, protects this box during transport of the van.

1-20. A 4-step vehicle boarding ladder (29) is stowed on the right front door of the van. Two beam power supply vents (5 and 39) are located on the front roadside and rear curbside walls. A feedthrough port (18) is located on the roadside wall next to the single door.

1-21. The underside of the van has provisions for stowing two personnel ladders, 15 tarpbow assemblies, two leveling jack shoes, a personnel platform, and a 12-foot ladder. A tool box and a spare tire (with wheel) are also stowed beneath the van.

1-22. The personnel passageway platform is equipped with adjustable legs on the outside corners. Each platform leg is collapsed, folded, and secured with a pin when the platform is stowed under the van. This pin is also used to secure the telescoping portion of the leg when it is extended to the ground. Pressure of each adjustable leg is distributed on the ground by a hinged pad. Support of the platform, provided by the adjustable legs, is especially required when a klystron tube is being moved or replaced in the klystron carriage of the 10-kw power amplifier. During this pro-

cedure, the klystron tube (on a dolly) is rolled onto dolly tracks that are secured to the top of the platform.

1-23. A vestibule enclosure (roof frame, supplied with diesel generator van of AN/MRC-85(V), all configurations) may be mounted over the personnel platform. This enclosure consists of a framed outer roof (without a mesh screen), which is attached to the curbside van wall by two hinged flanges. An inner roof (with mesh screening) is attached to the van wall by five hinged flanges, which are part of the outer roof. The inner roof is locked in position by two external roof braces that slide on the two outer detachable support pipes.

#### 1-24. DESCRIPTION OF VAN INTERIOR.

1-25. Figure 1-4 (sheets 1 and 2) shows the interior roadside and curbside views of the power amplifier van. Major components are shown in their normal operating positions, whereas maintenance items, waveguides, canvas bags, transit cases, and miscellaneous parts are shown in their stowed positions. Resilient mounts (base and rear) are provided for the following equipments:

- a. Two 10-kw power amplifiers
- b. Two 10-kw heat exchangers (base only)
- c. Two parametric amplifier racks
- d. One dummy load
- e. One dehydrator

1-26. Two transition duct frames (25) are stowed on the inside of the double doors on the front of the van. Three klystron tube storage cases (1) are stacked against the curbside wall. A canvas storage bag (2) containing air ducts is stowed on the floor in front of the storage cases. Four additional canvas storage bags (3), containing air ducts, and vestibule and passageway coverings, are stacked on the floor adjacent to the storage cases.

1-27. A wood crating tool kit (4), containing tools for crating components prior to shipment, is stowed against the curbside wall. A 10-kw power amplifier, consisting of an amplifier section (6) and power section (23), is positioned crosswise near the front of the van. A klystron carriage dolly (5) is stowed on the rear of the amplifier section. A dehydrator (24), located behind the power section, provides dry air (through tubing) to the waveguides in

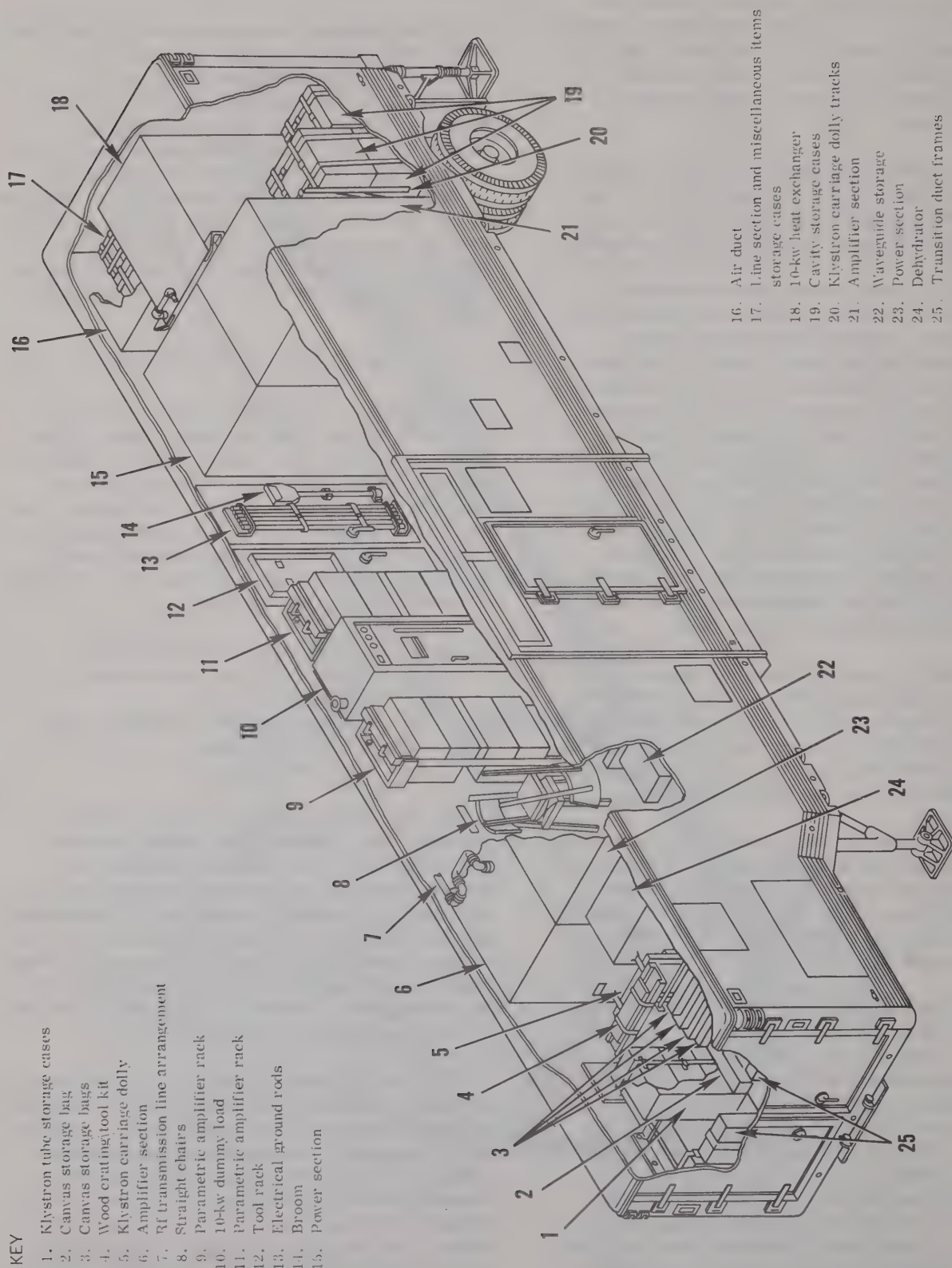


Figure 1-4. Van Interior View (Sheet 1 of 2)



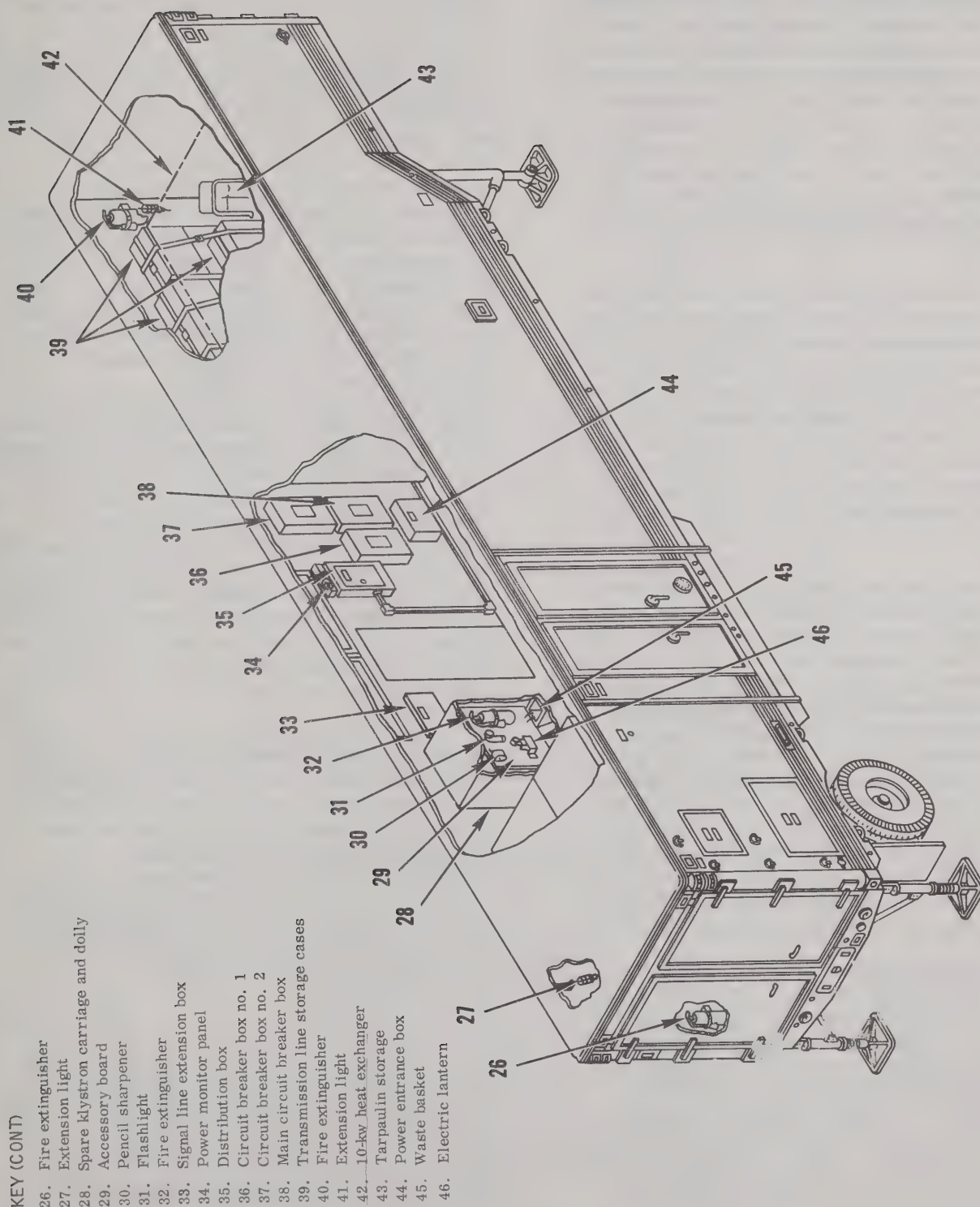


Figure 1-4. Van Interior View (Sheet 2 of 2)

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the power amplifier van; a vacuum gauge, inserted in the tubing, monitors the air flow.

1-28. Two straight chairs (8) are fastened to the curbside wall in the approximate center of the van. Arranged alongside the two chairs are two racks (9 and 11). Each rack contains two parametric amplifiers, two preselectors, and two converters for configurations A and B. Configuration C contains two parametric amplifiers and one parametric amplifier power control panel for each rack. A dummy load (10) is located adjacent to the two parametric amplifier racks. A tool rack (12) containing a pick mattock, shovel, and axe is mounted on the inside of the front curbside door. Six electrical ground rods (13) and a broom (14) are stowed on the inside of the other door.

1-29. A 10-kw power amplifier, consisting of a power section (15) and an amplifier section (21), is positioned crosswise at the rear of the van. Two klystron carriage dolly tracks (20) are stowed on the rear of the amplifier section. The two 10-kw heat exchangers (18 and 42) are located forward of the rear and front double doors. Air ducts (16) to each heat exchanger are connected to their respective intake and exhaust vents in the front roadside and rear curbside walls of the van.

1-30. Four line sections and miscellaneous item cases (17) are stowed against the curbside wall at the rear of the van. Three of the cases contain a total of seven rf transmission line sections; the fourth case contains copper tubing and three klystron air socket and duct assemblies. Three cavity cases (19) are stowed against the roadside wall at the rear of the van. Each case contains an input cavity, output cavity, and two additional cavities for each of the three klystron tubes. Waveguide storage (22) is provided in the center of the van, from the inside step to the curbside doors. An rf transmission line arrangement (7) is located on top of the amplifier section.

1-31. A spare klystron carriage and dolly (28) are stowed next to the 10-kw power amplifier near the roadside door. A signal line extension box (33) is mounted in the upper roadside wall next to the door. This box is used for external signal cable connections. An accessory board (29), containing a pencil sharpener (30), flashlight (31), fire extinguisher (32), waste basket (45), and electric lantern (46) is mounted on the roadside wall directly below the signal line extension box.

1-32. The POWER MONITOR panel (34) is located on the upper roadside wall forward of the doors. The assembly consists of a FREQUENCY meter, VOLTAGE meter, and a rotary switch mounted on the front panel. The meters indicate the frequency and voltage of phase A, B, or C as selected by the rotary switch. The input to the panel is by a cable feeding through the bottom of the assembly.

1-33. The DISTRIBUTION BOX (35), located on the roadside wall directly below the POWER MONITOR panel, consists of a metal cabinet with a hinged front door. Ten single-phase, two 2-phase, and four 3-phase manually operated circuit breakers are located in each of the two columns inside the cabinet. Blank panels are inserted into spaces not occupied by circuit breakers. The DISTRIBUTION BOX provides ac power to the following units: van lights, interior and exterior convenience outlets, parametric amplifiers, 10-kw dummy load, dehydrator, 10-kw heat exchangers, and antenna deicers (when utilized).

1-34. Two circuit breaker boxes (36 and 37) and a main circuit breaker box (38) are located on the roadside wall next to the DISTRIBUTION BOX. Each circuit breaker box consists of a metal cabinet with a hinged front door. A 3-phase circuit breaker is located within each box. The power entrance box (44) is located on the roadside wall directly below the circuit breaker boxes. The power entrance box provides input cable connection for the 120/208-volt, 60-cycle, 3-phase, 4-wire electrical power supplied to the van.

1-35. Nine transmission line cases (39) are stowed in three columns against the roadside wall at the front of the van: three are output coupler cases, three are harmonic filter and swept-elbow cases, and three are low pass filter and directional coupler cases. Fire extinguishers (26 and 40) and extension lights (27 and 41) are mounted on the front and rear part of the roadside wall. A tarpaulin (43) is stowed on the floor of the van, next to the transmission line storage cases.

#### 1-36. PURPOSE.

1-37. The power amplifier van provides the necessary rf output power amplification and the necessary preamplification of the incoming signals for an AN/MRC-85 type radio set (fig. 1-2). This radio set provides multiplex tropospheric scatter communications using diversity operation.



1-38. The power amplifier van contains electronic and electromechanical equipment which includes: (1) two 10-kw power amplifiers and associated equipment which are driven by two exciters in the operations van, (2) four parametric amplifiers which receive the rf input signals and convert them into 70-mc i-f signals for amplification by the four receivers in the operations van, (3) two diplexers and two receive filters located on the roof of the power amplifier van which allow simultaneous transmission and reception of the rf signals, and

(4) a dehydrator which provides the dry air for the waveguides.

#### 1-39. INFORMATION AND REFERENCE DATA.

1-40. Tables 1-1 through 1-4 provide information and reference data for the power amplifier van; table 1-1 lists leading particulars; table 1-2 lists capabilities and limitations; table 1-3 lists equipment supplied, and table 1-4 includes a list of equipment required but not supplied.

Table 1-1. Leading Particulars

Primary power requirements:	
AC power .....	120/208 v, 60 cy, 3 phase, 4 wire, 50 kw (nominal)
DC power .....	24 volts
Physical characteristics:	
Body type .....	Semitrailer van
Dimensions .....	35 feet in length, 8 feet wide and 11 feet in height
Weight (fully equipped) .....	18-1/2 tons
Front towing facility .....	King pin and fifth wheel
Rear towing suspension .....	Single axle with dual 10.00 X 20, 12-ply tires
Turning radius .....	Maximum 90° angle with respect to towing vehicle
Service brakes .....	Air
Parking brakes .....	None
Transportability	
Air .....	Military aircraft, type C-124, C-130, C-133, or larger
Shipboard .....	As appropriate and available
Rail .....	Railroad flatcar
Road .....	Standard U.S. military prime mover tractor; Type M-48, M-52, or M-221
Cable requirements .....	Tables 2-2 and 2-3 lists all interconnecting power and signal cables

Table 1-2. Capabilities and Limitations

Semitrailer van tire pressure	
Highway driving .....	70 psi
Cross country driving .....	50 psi
Sand driving .....	25 psi
Towing speeds	
Highway .....	55 mph
Cross country .....	15 mph
Air conditioning/heating .....	Supplied externally (by operations van)
Electronics equipment	
Type of modulation .....	Frequency modulation
Frequency range .....	755 to 985 mcs
Transmission range .....	300 miles (maximum)
Power output (each amplifier) .....	10 kw
Type of reception .....	Quadruple space and polarization diversity

Table 1-3. Equipment Supplied

Official Nomenclature	Common Name	Manufacturer and Part Number	Quantity	Usable On Code	Description
Radio Set Group OA-7007/MRC-85(V)2	Power Amplifier Van: Configuration A	Wickes 8750572-501		A	Contains, for the most part, two 10-kw power amplifiers, each delivering frequency modulated 10-kw rf output power to an associated antenna and is used as part of an AN/MRC-85 type radio set
Radio Set Group OA-6988/MRC-85(V)1 (Nomenclature Pending)	Configuration B	Adler 1036-400A1		B	
Semitrailer, Van, V-204/ MRC-85(V)	Configuration C	Adler 1057-400A1		C	
	Van only, U.S. Army Ordnance Type M373A2 (modified)	Miller 3168977 Miller 2948977/400	1 1	A B	
Configuration C (unassigned)		Miller 2948977/400	1	C	
Amplifier-Power Supply Group OA-2973/FRC-39A(V)	10-kw power amplifier	REL 954	2	A, B, C	Supplies a nominal 10-kw of rf output power
Amplifier, Radio Frequency AM-3634/MRC-98	Parametric amplifier	Northern Electric R21200A(REL 1055)	4	A, B	Used in conjunction with a receiver in the operations van for securing low noise rf amplification
Converter, Frequency, Electronic CV-1465/MRC-98	Converter	Northern Electric R21206A (REL 1054)	4	A, B	
Radio Set Group OA-2990/FRC-39A(V)	Parametric amplifier	Northern Electric R20650A (REL 959)	4	C	
	Parametric amplifier control panel	Adler 1036-405B1	2	C	
Filter, Tunable Rejection F-789/MRC-98	RF preselector	REL Type S-2038	1	A	
	RF preselector (S-2038 modified)	Wickes, 5701218	3	A	



Calorimeter DA-272/FRC-39A(V)	Dummy load	REL 957 (S-1902)	1	A, B, C	Serves as output load for either 10-kw power amplifier during tuning and adjustment
Dehumidifier, desiccant, electric, HD-501/MRC-85(V)	Dehydrator	Pittsburgh Lectrodryer Corp., BAC-250 SP McGraw-Edison Co., KS-16153	1	A	Provides constant source of low-pressure dry air to waveguides
Electron tube liquid cooler HD-661/FRC-39A(V)7	Heat exchanger	REL 955B	2	A	
Electron tube liquid cooler HD-431/FRC-39A(V)	Heat exchanger	REL 955	2	B, C	Supplies coolant to 10-kw power amplifier klystron tube
	Circuit breaker box, Installation of	Wickes 7760008-501 Adler 1036-400B23	1 1	A B, C	Contains main circuit breaker and no. 1 and no. 2 circuit breakers
	Primary circuit breaker no. 1 (CB427)	Square D, ML 3-417-S	1	A, B, C	Provides for application of 120/208-volt, 60-cycle, 3-phase power to power section no. 1 of 10-kw power amplifier no. 1
	Primary circuit breaker no. 2 (CB428)	Square D, ML 3-417-S	1	A, B, C	Provides for application of 120/208-volt, 60-cycle, 3-phase power to power section no. 2 of 10-kw power amplifier no. 2
	Main circuit breaker	Square D, ML 3-426-S	1	A, B, C	Provides for application of 120/208-volt, 60-cycle, 3-phase power to distribution box and to circuit breaker CB427
	Distribution box	Wickes 8750621-501 Adler 1036-411A1	1 1	A B, C	Controls and distributes ac power to interior and exterior van lights, interior convenience outlets, parametric amplifier power supplies, 10-kw dummy load, dehydrator, 10-kw heat exchangers, and antenna heaters

Table 1-3. Equipment Supplied (cont)

Official Nomenclature	Common Name	Manufacturer and Part Number	Quantity	Usable On Code	Description
Panel, Power Distribution SB-2324/MRC-85(V)2  Meter Assembly, Electrical ME-289A/MRC-85(V)2	Power distribution panel	Square D QOC30S	1	A	Monitors frequency and voltage of selected phase of 120/208-volt, 60-cycle, 3-phase incoming power
	Power monitor	Wickes 8750575-501 Adler 1036-400B7	1 1	A B, C	
Connector Assembly Electrical ME-289A/MRC-85(V)2 (Configuration A)	Signal line extension box	Wickes 8760003-501 Adler 1035-4000B18	1	A B, C	Provides for interconnecting rf and signal cables between power amplifier van and operations van
	Signal line extension panel	Wickes 7750540-501 Adler 1036-414B2-2		A B, C	
	Power entrance box	Wickes 8760002-501 Adler 1036-400B17	1	A B, C	
	Electron tube storage case, containing: Klystron tube	Wickes 8760019-501 Adler 1036-407A1 Eimac 4 KM 50000LQ	1 1	A B, C A, B, C	
	Klystron carriage and dolly	Wickes 8750653-501 Adler 1036-409B1	1	A B, C	Contains klystron tube
	Klystron carriage and dolly track	Wickes 7750539-501 Adler 1036-415B1	1 1	A B, C	
	Frame, air conditioning opening (transition duct frame)	Wickes 7750545-501 Adler 1036-300B3	4 4	A B, C	
	Spare klystron carriage and dolly	Wickes 87600446-501 Adler 1036-409A1	1 1	A B, C	
	Cavity case, stowage of containing: Input cavity	Wickes 8760012-501 Adler 1036-400B52 CFE CFE	1 1 1 1	A B, C A, B, C A, B, C	
	Cavity No. 2				



Cavity No. 3 Output cavity	CFE CFE	1 1	A, B, C A, B, C
Tubing, dry air	Wickes 8750646-501 Adler 1036-417B1	1 lot 1 lot	A B, C
Transmission line case, storage, containing: Output coupler case stowage Harmonic filter and swept elbow case stowage Low-pass filter and di- rectional coupler case stowage	Wickes 8760014-501 Adler 1036-400B57 Wickes 5760030-501 Adler 1036-400B54 Wickes 5760030-501 Adler 1036-400B55  Wickes 5760032-501 Adler 1036-400B56	1 1 1 1 1 1  1 1	Contains klystron carriage waveguide components  A B, C A B, C A B, C  A B, C
Low pass filter	Microlab LA-IO N	4	A, B
Low pass filter	Microlab LA-15 N	4	C
Air duct bag, containing: Passageway air duct hose	Wickes 8750627-501 Adler 1036-300D7 Wickes 8750626-501 Adler 1036-300D6  Wickes 87500631-501 Adler 1036-400D118	1 1 1 1  1 1	A B, C A B, C  A B, C
Air duct bag, containing: Liquid cooler air duct hoses	Wickes 8750630-501 Wickes 8750630-502 Wickes 8750630-503 Wickes 8750630-504  Adler 1036-400D111-1 Adler 1036-400D111-2 Adler 1036-400D111-3 Adler 1036-400D111-4	1 1 1 1  1 1 1 1	A A A A  B, C B, C B, C B, C
Vestibule covering bag, containing: Vestibule covering	Wickes 8750632-501 Adler 1036-415D10-1 Wickes 8750661-501 Adler 1036-400D142-1	1 1 1 1	A B, C A B, C
Wood crating tool kit, consisting of: Wrecking bar, 36 inch Wrecking bar, 24 inch Hand saw	Wickes 5760028-501 Adler 1036-400B48 Stanley, No. 136 Stanley, No. 124 Disston, No. D-7	1 1 1 1 1	Contains tools for crating and uncrating of components stored in transit cases  A B, C A, B, C A, B, C A, B, C

Table 1-3. Equipment Supplied (cont)

Official Nomenclature	Common Name	Manufacturer and Part Number	Quantity	Usable On Code	Description
Flashlight MX-212A/U	Nail puller Bolt clipper	Giant, No. 101 H.K. Porter, No. 1-NE	1 1	A, B, C A, B, C	
	Accessory board, consisting of:	Wickes 7760009-501	1	A	
	Pencil sharpener	Adler 1036-400B19	1	B, C	
	Flashlight	Thier, Boston KS	1	A, B, C	
	Fire extinguisher, carbon dioxide	Walter Kidde and Co. 5KS	1	A, B, C	
	Waste paper basket	Erie Art Metal Co., No. 36	1	A, B, C	
	Electric lantern	Justrite Mfg Co. 2105-4	1	A, B, C	
	Extension light	Eagle No. 495	2	A, B, C	
	Fire extinguisher	Walter Kidde and Co., 5F-1	2	A, B, C	
	Electrical ground rod	Hubbard and Co. 29445	2	A, B, C	
	Broom	Osborne Mfg Co. 1820	1	A, B, C	
	Straight chair	Wickes 8750576 Adler 1036-400B29	2 2	A B, C	
	Mounting assembly, filter and diplexer	Wickes 8750595-501	1	A, B	Waveguides include filters and diplexers for mounting on roof of power amplifier van
	Waveguide assembly, internal arrangement	Wickes 8750645-501 Adler 1036-419B1	1 1	A B, C	Waveguides for mounting inside van
	Waveguide assembly, external arrangement	Adler 1036-421A1	1	C	Waveguides for mounting on roof of power amplifier van including filters and diplexers
	Line section and miscel- laneous items storage case	Wickes 8760015-501 Adler 1036-400B58	1 1	A B, C	Contains klystron carriage line sections and miscella- neous components
	Vehicle boarding ladder	Ordinance 10907025	1	A, B, C	



Folding step	Miller 7092486	12	A, B, C
12-foot ladder	Miller 2948974	1	A, B, C
Personnel ladder	Miller 2949925	2	A, B, C
Personnel platform	Wickes 8750667-501	1	A
Leveling jack:			
Left hand	Miller 31681025-1	1	A, B, C
Right hand	Miller 31681025-2	1	A, B, C
Vehicular tarp bows:		15	A, B, C
End	Miller 31681045	2	
Intermediate	Miller 3168958	10	
Intermediate (one leg shorter)	Miller 3168858	3	
Spare tire and wheel consisting of:		1	A, B, C
Tire	Ordinance 5145201	1	A, B, C
Wheel	Ordinance 738820	1	A, B, C
Inner tube	Ordinance 519448		A, B, C
Tool box, consisting of:		1	A, B, C
Pliers, side cutting, with stripping notches, 5-1/2 in.	Klein, Mathias, and Sons, Inc., 245-5w	1	
Pliers, oblique, cutting, 6 in.	Klein, Mathias, and Sons, Inc., 3-1-5	1	
Pliers, long nose, 5 in.	Klein, Mathias, and Sons, Inc., 3-1-5	1	
Pliers, short jaw, long handle, 8 in., pointed nose	Krauter Weber Tool Works, 61	1	
Pliers, pump, channel lock, 9-1/2		1	
Pliers, side cutting, 7 in.	Krauter Weber Tool Works, 1830	1	
Pliers, chain nose, 5 in.	Krauter Weber Tool Works, 1643	1	
Knife, electrician's, double blade	Camillus Cutlery Co.	1	
Hammer, machinist, ball peen, 8 oz	Head-Plumb, 0317	1	
Screwdriver, offset, Phillips, No. 1 and 2 points	Stanley Machine and Tool Co., 2612	1	
Screwdriver, offset, slotted head, ratchet	Stanley-Yankee Tools Inc., 3400	1	

Contains power amplifier van tools

Table 1-3. Equipment Supplied (cont)

Official Nomenclature	Common Name	Manufacturer and Part Number	Quantity	Usable On Code	Description
	Screwdriver, Phillips, No. 3, 6 in. blade	Stanley Machine and Tool Co., 2703	1		
	Screwdriver, close quarters, 1/2 in. blade	Millers Falls Co., 654	1		
	Screwdriver, Phillips, No. 2 point	Stanley Machine and Tool Co., 17121	1		
	Screwdriver, slotted head, 4 in. blade	Stanley Machine and Tool Co., 70	1		
	Screwdriver, slotted head, 6 in. blade	Millers Falls Co., 653	1		
	Screwdriver, Phillips, No. 1, 3 in. blade	Stanley Machine and Tool Co., 2701	1		
	Screwdriver, slotted head, 10 in. blade	Miller Falls Co., 853	1		
	Screwdriver, slotted head, pocket type, 2 in. blade	Stanley Machine and Tool Co., 1010	1		
	Kit, tool alignment, all purpose	G.C. Electronics Mfg. Co., 8457	1		
	Wrench, adjustable, 6 in.	Crescent Tool Co., A-16	1		
	Kit, wrench, hex and spline	Walsco Electronics Corp., 560	1		
	Set, wrenches, open end, miniature, in leatherette roll		1		
	Flashlight, 2 cell e/w batteries and bulb	Eveready, 2251	1		
	Tweezers	G.C. Electronics Mfg. Co., 7950	1		
	Mirror, inspection	G.C. Electronics Mfg. Co., 5090	1		
	Extractor, fuse, pocket size	Eagle Electric Mfg. Co., 642	1		
	Straightener, tube pin, for 7 and 9 pin miniature tubes	G.C. Electronics Mfg. Co., 8655	1		
	Gun, soldering, dual heat, 100 and 150 watts	Weller Electric Corp., D-440	1		
	Iron, soldering, screwtip, 60 watts, 120 volts	Vulcan Electric Co., 30	1		
	File, round, 8 in. tapered double cut, second cut		1		



File, three square, 6 in. bastard, double cut			1
Handle, file, for 6 to 8 in., common, soft wood with iron ferrule			
Puller, tube, 90° angle	Hunter, D-2		1
Wheel, grinding, 6 in.	Black and Decker Mfg. Co., 39022B		1
Wheel, grinding, 6 in.	Black and Decker Mfg. Co., 39022D		1
Wheel, grinding, 6 in.	Black and Decker Mfg. Co., 39023B		1
Wheel, grinding, 6 in.	Black and Decker Mfg. Co., 39023D		1
Torch, burning, portable	TX-11		1
Torch, blow, heavy duty, 10 qt capacity	Clayton and Lambert Mfg. Co., 32A		1
File, flat, 12 in. double cut			1
File, flat, 10 in. single cut			1
File, half round, 12 in. double cut			1
Scissors, electricians, 5 in.	Klein, Mathias, and Sons, Inc., 2100-5		1
File, round, 10 in. double cut			1
Handle, file, for 8 to 12 in. files, soft wood with iron ferrule			2
Frame, hacksaw, keyhole with blade	Millers Falls Co., 237		1
Blade, hacksaw, 12 in., 18 teeth per inch	Disston, Henry, and Sons, Inc., F-1218		6
Blade, hacksaw, 12 in., 24 teeth per inch	Disston, Henry, and Sons, Inc., F-1224		6
Screwdriver, 5-1/2 in.	Stanley Machine and Tool Co., 415		2
Knife, linesman's skinning	Klein, Mathias, and Sons, Inc., 1570-3		1
Wrench, vise grip, 10 in.	Peterson's Tool and Die Works, 10		1
Wrench, adjustable, 12 in.	Crescent Tool Co., A-12		1
Dividers, 8 in., spring type	Starrett, L.S., Co., 83		1
Bar, wrecking, gooseneck, 36 in., steel	Stanley Machine and Tool Co., 130		1
Kit, flaring and cutting	Imperial-Eastman Corp., 226F		1
Gauge, wire, American standard	Brown and Sharpe Mfg. Co., 688		1

Table 1-3. Equipment Supplied (cont)

Official Nomenclature	Common Name	Manufacturer and Part Number	Quantity	Usable On Code	Description
	Chisel, cold, 5/16 in. wide, 5 in. long, 1/4 in. stock	Stanley Machine and Tool Co., 1C	1		
	Chisel, cold, 5/8 in. wide, 6 in. long, 1/2 in. stock	Stanley Machine and Tool Co., 1C	1		
	Chisel, cold, 3/4 in. wide, 6-1/2 in. long, 5/8 in. stock	Stanley Machine and Tool Co., 1C	1		
	Chisel, cold, 1 in. wide, 12 in. long, 7/8 in. stock	Stanley Machine and Tool Co., 1B	1		
	Wrench, pipe, 10 in. adjustable, 1/8 to 1 in. opening		1		
	Punch, pin, 1/8 x 4 in. point, 5/16 in. stock	Giddings and Lewis Machine Tool Co., 2864	1		
	Punch, pin, 1/4 x 6 in. point, 3/8 in. stock	Giddings and Lewis Machine Tool Co., 2866	1		
	Set, screwdrivers, jewelers	Moody Machine Products Co., Inc., SC 5	1		
	Extractor, tube and parts	G.C. Electronic Mfg. Co., 5092	1		
	Set screw extractor	Greenfield Tap and Die, 1820	1		
	Puller, wire	Klein, Mathias, and Sons, Inc., 1702-20	3		
	Iron, soldering, 300 watts, 110 volts				
	Kit, alignment	G.C. Electronics Mfg. Co., 8283	1		
	Kit, nut driver	Xcelite, Inc., 137	1		
	Calipers, slide 5 in., pocket type	Starrett, L.S. Co., 425	1		
	Mallet, rawhide faced 2 in. in diameter		1		
	Screwdriver, offset, slotted head, ratchet	Stanley-Yankee Tools, Inc., 3800	1		
	Pliers, chain nose, 5 in.	Klein, Mathias, and Sons, Inc., 317-5	1		



Table 1-4. Equipment Required but Not Supplied

Federal Stock No.	Description	Quantity
6625-724-8582	Multimeter, AN/PSM-6 ( ), or equivalent	1
5120-255-4458	Burnisher, contact	1
8020-721-9657	Brush, paint 2 x 1-1/2 in.	1
7920-205-3453	Cloth, cleaning, Federal Specification CCC-F-46	As required
6810-664-0387	Solvent, dry cleaning, Federal Specification O-T-620A, 1 gl. can	As required
9150-223-4012	Grease, sealed bearing, MILL-G-3278	As required
9150-190-0905	Grease, chassis lubrication, MIL-G-10924	As required
4930-247-3670	Greasegun, hand	1
5350-598-6107	Flint, abrasive paper	As required
5120-187-1044	Hammer, 8 lb, 32 in. handle	1
8030-616-7694	Pipe Sealing Compound	1 lb can
	Wrench, torque	1
5210-274-2857	Gage, feeler, 0.0015 to 0.025 in. by 1000th's, 26 blades	1
8070-597-5301	Brush, oval style, 7/8 x 2-1/8 in.	1
5120-293-0783	C-clamp, heavy service, 12 x 4 in.	1
	Passageway and vestibule framing bag (Wickes Part No. 8700310 configuration A)	1
	containing:	
	outer roof frame	2
	center support	2
	end support	4
	passageway canvas support	2
	Passageway and vestibule framing bag (Adler Part No. 1036-600D82 configurations B and C)	1
	containing:	
	outer roof frame	2
	center support	2
	end support	4
	passageway canvas support	2





## CHAPTER 2

### INSTALLATION

2-1. INTRODUCTION. This chapter provides installation data for the power amplifier van. Section I discusses installation planning, including reference data, site selection, equipment interrelationship, and ac power and grounding requirements. Section II contains

information on logistics including receiving data, cable information, and air conditioning and heating requirements. Section III contains installation procedures. Section IV discusses preparation of the equipment for shipment.

### SECTION I

#### INSTALLATION PLANNING

2-2.

Deleted

2-3.

Deleted

e. Air, water, and land transportation facilities; their proximity to the site, and their maximum tonnage-handling capacities.

f. Complete weather data, such as rainfall, wind velocity and direction, frost lines, humidity, and temperature (monthly and annual averages as well as maximums).

g. Power facilities available, including type of existing power, rated voltage and frequency regulation, current capacity, evaluation of the present power facilities, and proposed or required expansions.

h. Access to other military facilities.

i. Natural obstructions.

j. Navigational hazards, resulting from proposed construction.

k. Potable water availability.

#### 2-4. SITE SELECTION.

2-5. In selecting a site it is important to consider the following factors:

a. The terrain at a proposed site should slope downward, as much as possible for the first few thousand feet in the direction of the distant station.

b. Road and soil conditions in immediate site area, including drainage, soil bearing capacity, type of soil, and location of roads.

c. Earth moving and clearing requirements.

d. Radio interference and radiation hazards from other nearby facilities.

#### 2-6. EQUIPMENT INTERRELATIONSHIPS.

2-7. The physical location of the van with respect to associated vans and other equipment at the site is an important consideration. The distances between the power amplifier van and other equipment is determined primarily by site requirements. Figure 2-1 illustrates equipment interrelationships at a typical site.

Figure 2-2 illustrates a typical floor plan and shows dimensions between equipment installed in the power amplifier van.

## 2-8. AC POWER AND GROUNDING REQUIREMENTS.

2-9. Primary power required by the power amplifier van is 120/208-vac, 60-cycle, 3-phase, 4-wire, at 50 kw (nominal). If the power amplifier van is installed with a fixed station facility, the station grounding system shall be used. At those sites which are complete mobile installations, no separate grounding system is required. The neutral section of the power cable is electrically grounded to each van, placing the entire complex at common ground potential. At any rate, equipment should be grounded in accordance with approved procedures.

## 2-10. ANCILLARY FACILITIES.

2-11. The operations van, diesel generator van and associated antennas (p/o AN/MRC-85 system) are normally associated with the power amplifier van in a typical mobile installation.

## 2-12. ALLIED CONSTRUCTION REQUIREMENTS.

### 2-13. TRENCHES.

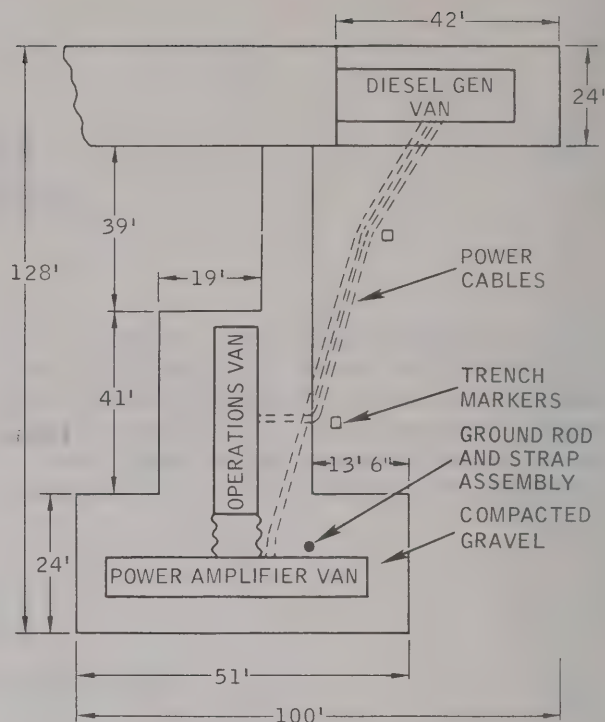
2-14. If the power amplifier van is installed in areas of heavy rainfall, it is recommended that a shallow trench be constructed around the perimeter of the van.

### 2-15. TYPICAL HARDSTAND LAYOUT.

2-16. After the van position has been selected, the power amplifier van should be installed on steel-reinforced concrete hardstands (fig. 2-3). The hardstands, installed by a construction team, must be constructed with the following characteristics:

a. All concrete used must have a minimum compressive strength of 2500 psi, 28 days after pouring.

b. The reinforcing steel used must be of structural grade, new billet, plain bar type



### NOTES:

1. TRENCH FOR POWER CABLES TO BE AT LEAST 2 FT DEEP AND 1-1/2 FT WIDE. CABLES SHOULD BE COVERED WITH 6 IN. OF SAND AND THEN CLEAN FILL DIRT.
2. AT LEAST 3 IN. OF CRUSHED GRAVEL OR OTHER SUITABLE MATERIAL SHOULD BE SPREAD AROUND VANS IN THE AREA OUTLINED.
3. TRENCH MARKERS OF 2 X 4 LUMBER, AT LEAST 5 FT LONG, SHOULD BE PROVIDED. THEY SHOULD BE DRIVEN TO A DEPTH OF 3 FT AND BE PLACED 2 FT FROM THE CABLE TRENCH.

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Figure 2-1. Typical Site Details

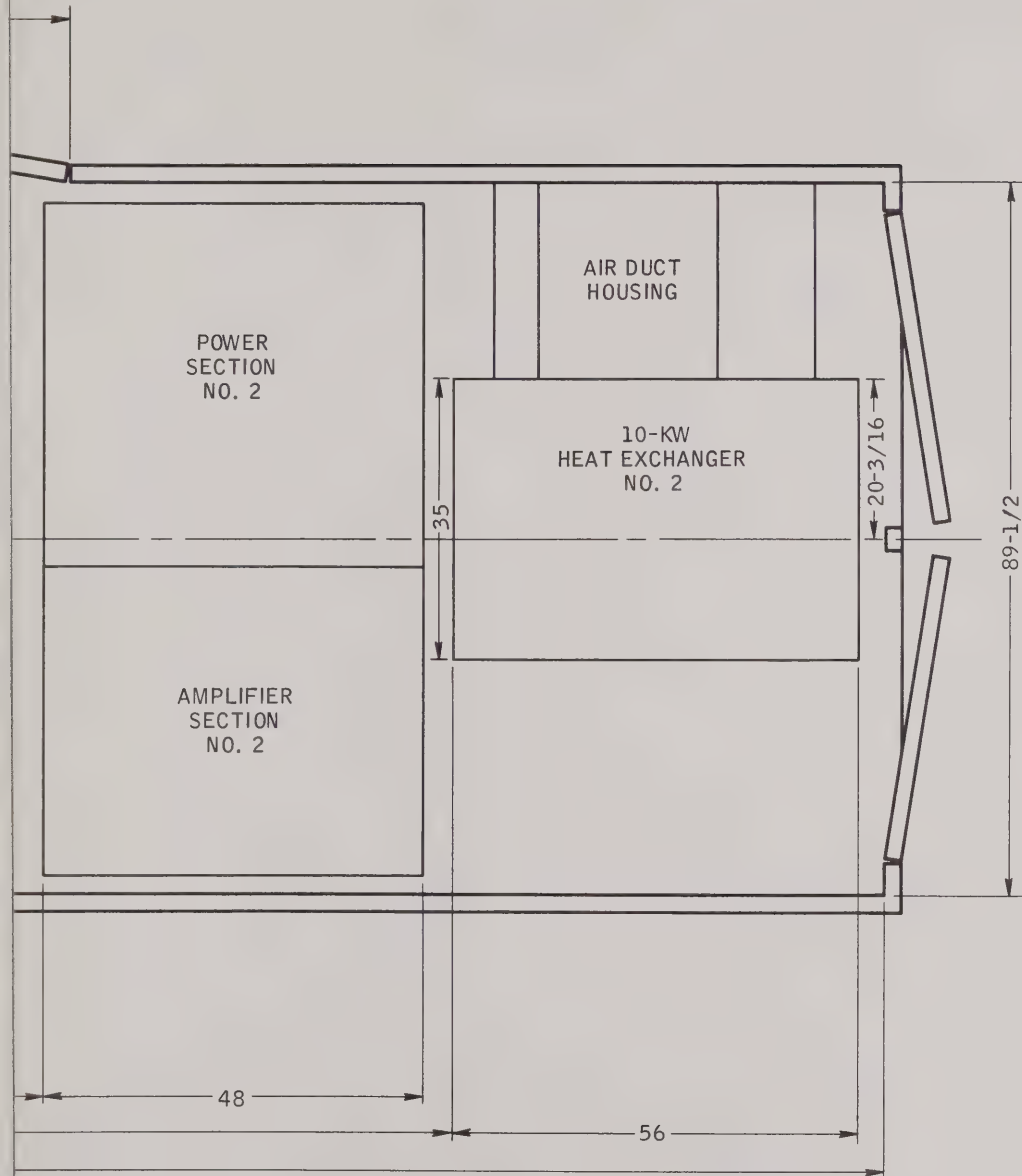
(fs = 18,000 psi). All bars, either plain or deformed, shall be tack welded together.

c. A minimum of 3 inches of concrete shall cover all steel bars.

d. All pads and hardstands shall be separated with one layer of tar paper.

e. Compacted material around the hardstands shall be coral, gravel, or other material found locally.





NOTE:  
ALL DIMENSIONS ARE  
IN INCHES.

Figure 2-2. Typical Floor Plan

Figure 2-2 illustrates a typical floor plan and shows dimensions between equipment installed in the power amplifier van.

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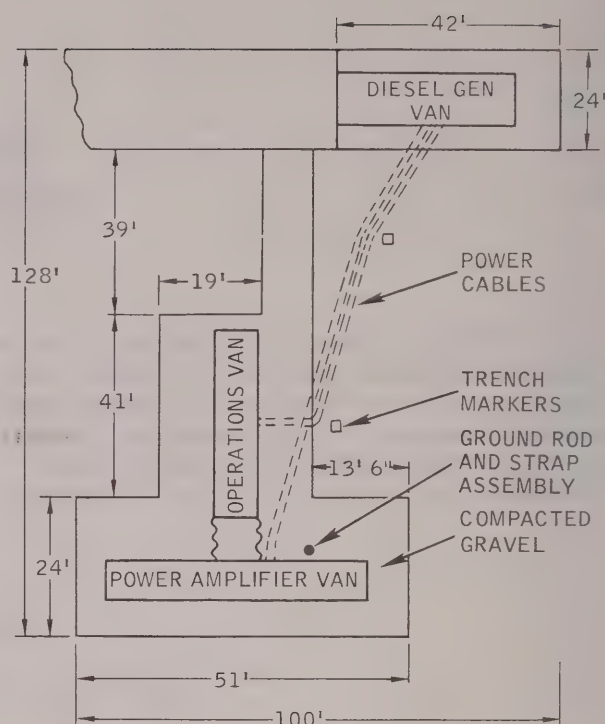
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NOTES:

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2. AT LEAST 3 IN. OF CRUSHED GRAVEL OR OTHER SUITABLE MATERIAL SHOULD BE SPREAD AROUND VANS IN THE AREA OUTLINED.
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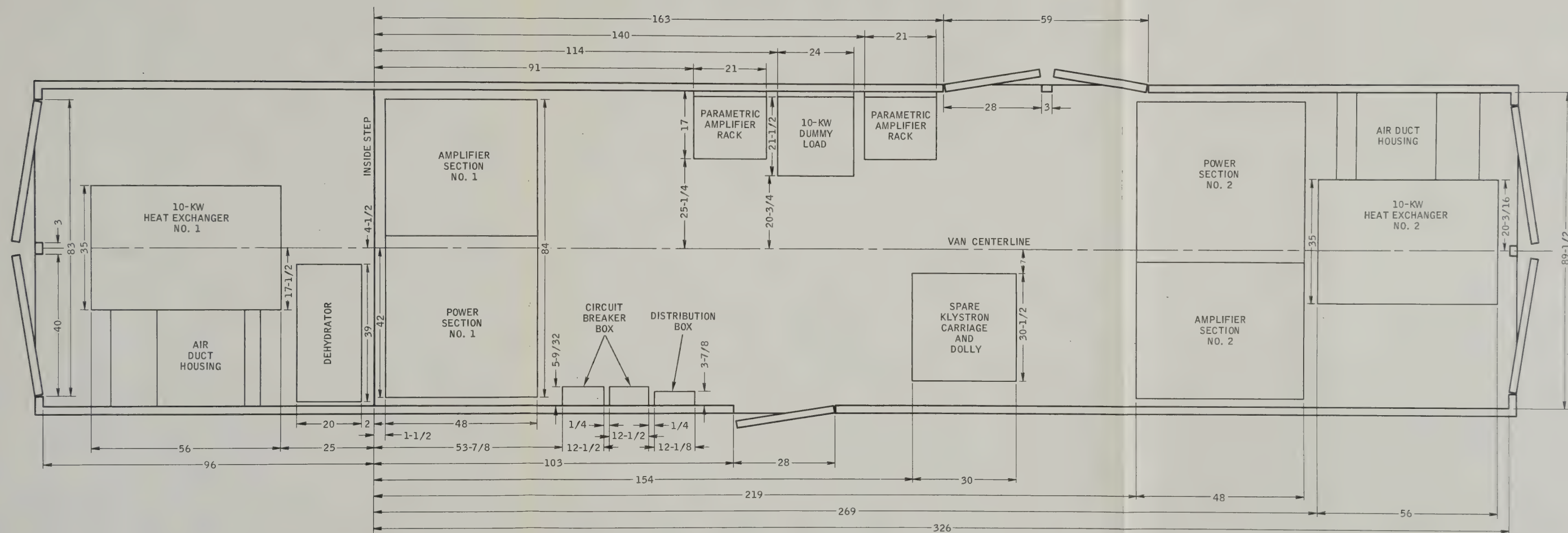
Figure 2-1. Typical Site Details

( $f_s = 18,000$  psi). All bars, either plain or deformed, shall be tack welded together.

c. A minimum of 3 inches of concrete shall cover all steel bars.

d. All pads and hardstands shall be separated with one layer of tar paper.

e. Compacted material around the hardstands shall be coral, gravel, or other material found locally.

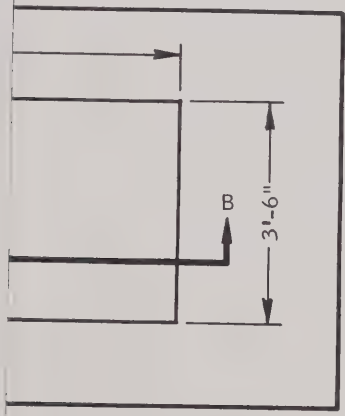
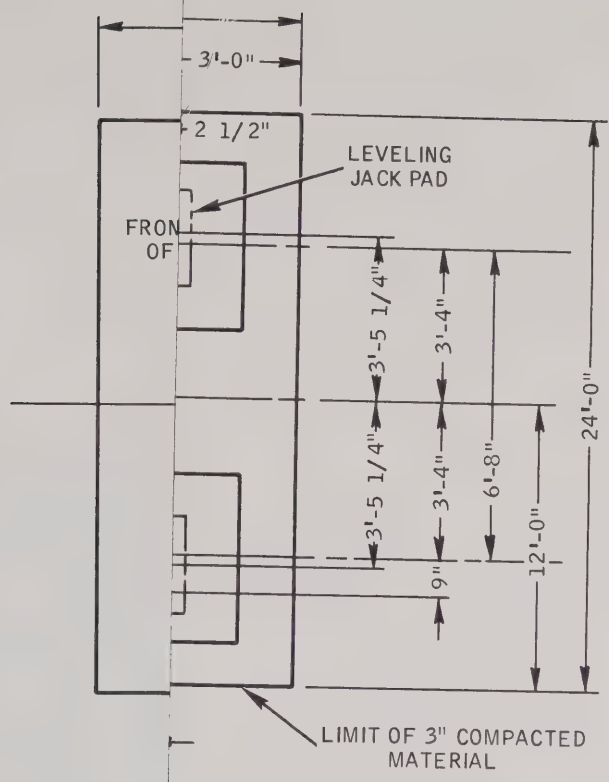


NOTE:  
ALL DIMENSIONS ARE  
IN INCHES.

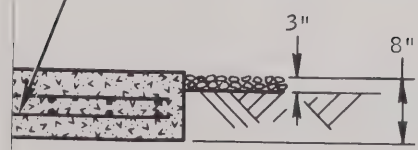
Figure 2-2. Typical Floor Plan





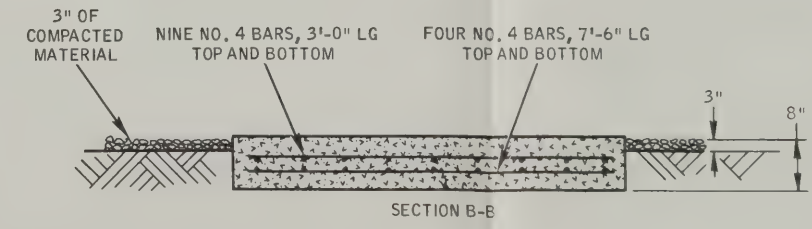
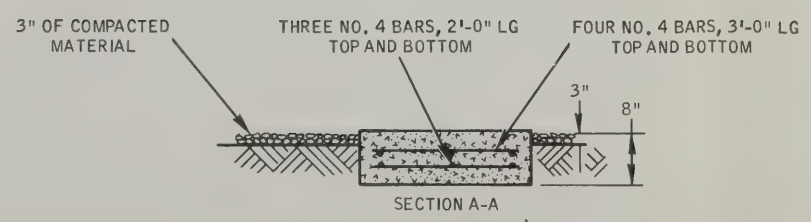
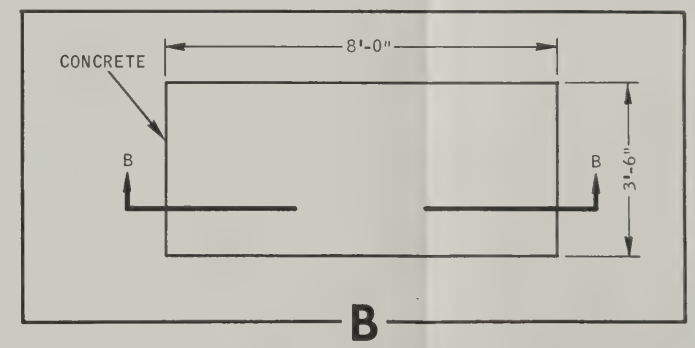
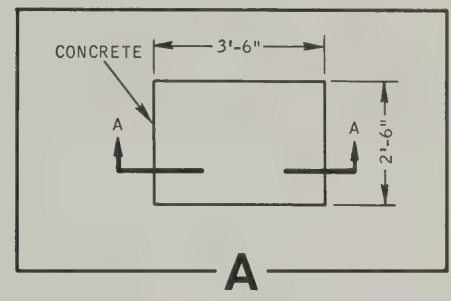
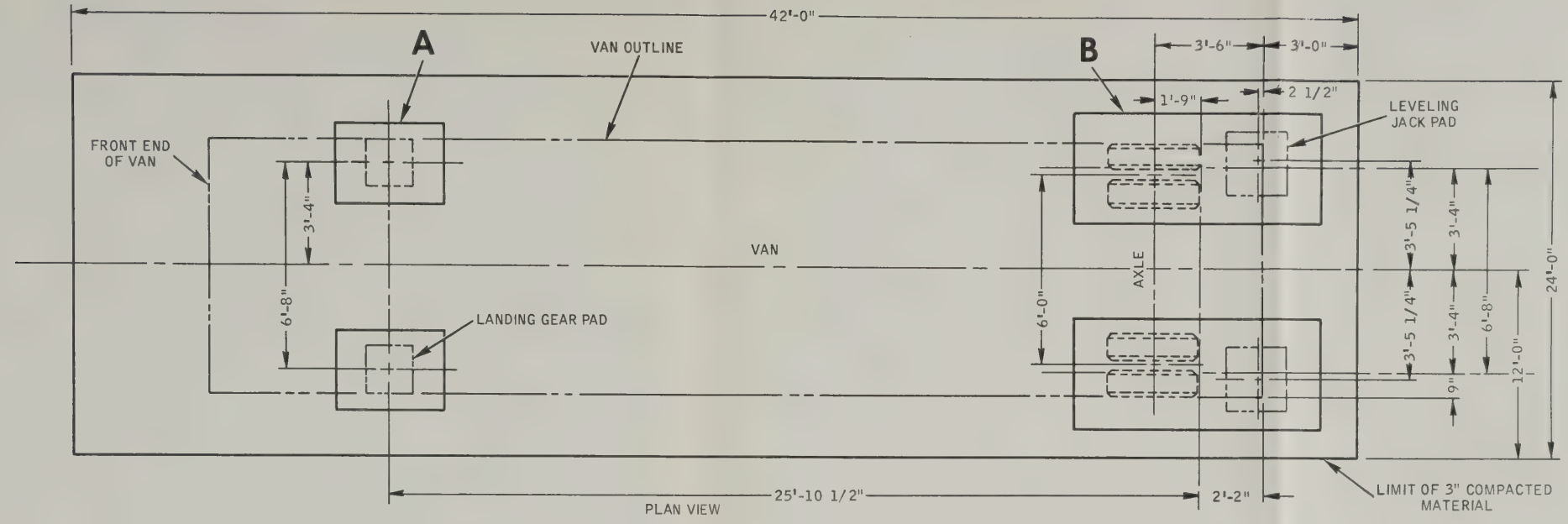


2. 4 BARS, 7'-6" LG  
AND BOTTOM









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Figure 2-3. Typical Hardstand Layout



## SECTION II

## LOGISTICS

### 2-17. RECEIVING DATA.

2-18. The power amplifier van may be shipped as a complete unit with the waveguide installation stowed in the van or it may be necessary to ship the van to the site partially disassembled by removing the running gear, brake system and landing gear in addition to the waveguide installation. The waveguide installation and other components stowed in the van may be shipped separately as listed in table 2-1 for configuration A. Table 2-1 includes crate dimensions, weight and volume. Crating data for configurations B and C are not listed because of the inconsistencies in shipping methods. The crating information for separate items shipped for configurations B and C should be obtained from the manufacturer's shipping list. Van dimensions and weights (all configurations) are listed in table 1-1.

### 2-19. TRANSPORTATION METHODS.

2-20. Conventional methods of transportation

for the power amplifier van are listed in table 1-1. On site, the power amplifier van may be moved by a military prime mover, truck or tractor. For particularly rugged terrain, it may be necessary to use a bulldozer or similar equipment.

### 2-21. CABLE REQUIREMENTS.

2-22. Tables 2-2 and 2-3 list all incoming and interconnecting cables to the power amplifier van for configurations A, B, and C as used with the operations and diesel generator van. Interconnecting cabling diagrams shown in Chapter 6 shall be used when making these cable connections.

### 2-23. AIR CONDITIONING AND HEATING REQUIREMENTS.

2-24. The power amplifier van is provided with ductwork for connection to an external air conditioning and heating system.

Table 2-1. Items Shipped Separately

Crate No.	Dimensions (in)			Weight (lbs.)	Volume (cu ft)	Contents
	L	W	D			
1	90	23	20	674	24.0	Waveguide stowage supports containing: 2 ea. no. 522D3-2 c/o 2 ea. D10 large clamps 3 ea. no. 522D3-2 w/o clamps 3 ea. no. 522D3-2 c/o 2 ea. D9 small clamps 2 ea. no. 522D3-2 c/o 3 ea. D9 small clamps
2	77	21	15	325	13.9	Waveguide stowage supports containing: 2 ea. no. 522D3-1 with "U" bracket 4 ea. no. 522D2-2 waveguide brackets w/4 knobs 4 ea. no. 522D2-2 waveguide brackets w/6 knobs
3	53	40	45	495	55.2	12 ea. duplexer tuning stubs



Table 2-1. Items Shipped Separately (cont)

Crate No.	Dimensions (in)			Weight (lbs.)	Volume (cu ft)	Contents
	L	W	D			
4	44	29	59	2525	43.6	Beam power transformer
5	44	29	59	2525	43.6	Beam power transformer
6	51	41	76	890	92.0	Klystron carriage assembly Klystron carriage dolly assembly, Wickes no. 181-409B1
7	51	41	76	890	92.0	Klystron carriage assembly Klystron carriage dolly assembly
8	50	41	73	860	86.6	Klystron carriage assembly 4 ea. fan blades
9	147	17	27	290	39.1	2 ea. antenna tuner
10	64	21	60	563	46.9	Transit cases 1, 2, & 3 Case no. 1 consisting of 1 ea. klystron tube Case no. 2 consisting of 1 ea. klystron tube Case no. 3 consisting of 1 ea. klystron tube
11	48	42	43	550	50.2	Transit cases 12, 13, 14, & 7 Case no. 12 consisting of: 4 ea. klystron cavities 4 ea. heat exchanger duct 2 ea. rf connector KA 91-09 Case no. 13 consisting of: 4 ea. klystron cavities Case no. 14 consisting of: 4 ea. klystron cavities Case no. 7 consisting of: 2 ea. 3-1/8 in. coaxial elbow & sleeve assembly 3 ea. air flow switches 3 sets flexible tubing 3 sets flexible coaxial leads for klystron 3 ea. supports AAB102 3 ea. 3-1/8 in. coaxial couplings 2 ea. heliax cables 3 sets coolant tubing 3 sets drive shafts 1 ea. 3-1/8 in. coaxial adapters 3 ea. klystron tube sockets 2 ea. 3-1/8 in. coaxial elbows 2 ea. 3-1/8 in. pressurizing adapters 1 ea. Lenkurt field modification 1 ea. orderwire handset 1 ea. baseband & orderwire patch panel gnd. mod. 4 ea. 181-410B3 tie downs 1 ea bag, misc. hardware

Table 2-1. Items Shipped Separately (cont)

Crate No.	Dimensions (in)			Weight (lbs)	Volume (cu ft)	Contents
	L	W	D			
12	48	42	31	640	36.2	Transit cases 4, 5, 8, 9, 11, 16, 17, & 23 Case no. 4 consisting of: 4 ea. klystron coils Case no. 5 consisting of: 4 ea. klystron coils Case no. 8 consisting of: 2 ea. 3-1/8 in. coaxial feedthru Case no. 9 consisting of: 2 ea. 1-5/8 in. coaxial feedthru Case no. 11 consisting of: 2 ea. lug wrench & handle 2 ea. air vent pipes 2 ea. platform stowage rod w/flat washer, plate, & box handle nut 2 ea. leveling jack handles 1 ea. axle hub nut wrench (no. 3256) 1 ea. cable entrance port boot 4 ea. camlock wrench 4 ea. Spare klystron tie down assembly (191-409D5) 48 ea. red tie down knobs (181-410B3) 1 ea. fabric cable trough 2 ea. cable trough frame (181-SK 5543) 1 ea. canvas bag for wood crating tools 4 ea. tie downs for waveguide components case w/mtg hardware (181-500D64-1) 1 ea. tie down bracket for tool box w/mtg hardware (181-500D61) 4 ea. nylon rope 3 ft lg (12 ft ladder tie down) 40 ea. bolts 5/8-14 x 5 in. 48 ea. flat washer 5/8 48 ea. nuts 5/8-14 48 ea. lockwasher SR 5/8 8 ea. nuts 5/8-14 x 7 in. long 1 ea. bag, misc. hardware 4 ea. clamp w/hardware for 12 ft ladder 12 ea. 8074-21 "U" clamp 2 ea. test equipment & accessory bags Case no. 16 consisting of: 1 ea. output coupler Case no. 17 consisting of: 1 ea. output coupler Case no. 23 consisting of: 1 ea. low pass filter and directional coupler
13	48	42	33	964	38.5	Transit cases 6, 10, 15, 18, 19, 20, 21, & 22 Case no. 6 consisting of: 4 ea. klystron coils Case no. 10 consisting of: 3 ea. manual 3-1/8 in. coaxial patch Case no. 15 consisting of: 1 ea. output coupler Case no. 18 consisting of: 1 ea. harmonic filter and swept elbows

Table 2-1. Items Shipped Separately (cont)

Crate No.	Dimensions (in)			Weight (lbs)	Volume (cu ft)	Contents
	L	W	D			
						Case no. 19 consisting of: 1 ea. harmonic filter and swept elbows Case no. 20 consisting of: 1 ea. harmonic filter and swept elbows Case no. 21 consisting of: 1 ea. low pass filter & directional coupler Case no. 22 consisting of: 1 ea. low pass filter & directional coupler
14	120	23	19	350	30.4	50 ohm coaxial transmission line containing: 8 ea. stowage assemblies. Assembly no. 1 thru no. 8 4 ea. parametric amplifier filter cable
15	79	65	29	690	86.2	1 ea. vestibule platform 1 ea. vestibule roof frame 2 ea. side rails (55-9/16 in. lg) w/adj flange 1 ea. front rail (71-1/2 in. lg) w/1 tee & 2 side O. L elbows 2 ea. roof brace (54 in. lg) w/adj tee 2 ea. passageway frame assembly 4 ea. leveling jack pad 4 ea. bow stowage channel 2 ea. bow stowage clamp
16	160	26	34	590	54.2	2 ea. ladder, 3 step 13 ea. tarp bows, straight 2 ea. tarp bows, bent 2 ea. tarpaulins
17	88	45	41	1000	93.9	4 ea. bow support rods, 36 in. 3 ea. bow support rods, 39 in. 23 ea. bow support rods, 42 in. 2 ea. pole support 83-7/8 in. lg. 1 ea. pole support 84-1/8 in. lg. 2 ea. pole support 83-7/8 in. lg. 1 ea. pole support 84-1/8 in. lg. 2 ea. passageway platforms (one w/flap) 2 ea. passageway frame assembly 6 ea. platform mounting brackets 1 ea. tire 2 ea. tarp bow tie 2 ea. 181 SK-8074-19 2 ea. platform brace
18	144	14	6	42	7	1 ea. ladder, 12 ft.



Table 2-2. Cable Requirements (configuration A)

Power Amplifier Van from Diesel Generator Van

Cable	From			To		Length (feet)
	Use	Unit	Terminal	Unit	Terminal	
W312 (4/OA WG, type G, 3 conductors)	Ac input power	Power output panel	J602	Power entrance box	J416	125
W313 (300 MCM, type G, 3 conductors)	Ac input power	Power output panel	J601	Power entrance box	J415	125

Power Amplifier Van to Operations Van

W308 (25 pairs no. 19 AWG)	Fault indicator no. 1	Signal line extension box	J406	Signal line extension	J506	
W309 (25 pairs no. 19 AWG)	Fault indicator no. 2	Signal line extension box	J407	Signal line extension box	J507	

RF Cabling

W301	Exciter no. 2 to power amplifier no. 2	Signal line extension box	J520	Signal line extension	J420	
W302	Exciter no. 1 to power amplifier no. 1	Signal line extension	J521	Signal line extension panel	J421	
W303	Ground cables	Power entrance box	Gnd	See paragraph no. 2-61		
	Parametric amplifier no. 1 to receiver no. 1	Signal line extension box	J401	Signal line extension box	J501	
W304	Parametric amplifier no. 2 to receiver no. 2	Signal line extension box	J402	Signal line extension box	J502	
W305	Parametric amplifier no. 3 to receiver no. 3	Signal line extension box	J403	Signal line extension box	J503	

Table 2-2. Cable Requirements (configuration A) (cont)

## RF Cabling (cont)

Cable	From			To		Length (feet)
	Use	Unit	Terminal	Unit	Terminal	
W306	Parametric amplifier no. 4 to receiver no. 4	Signal line extension box	J404	Signal line extension box	J504	
W307	Test cable	Signal line extension box	J517	Signal line extension box	J417	
W571 (RG9B/U)	Connection for by-pass- ing low pass filter in parametric amplifier no. 1	Preselector	Output	Parametric amplifier	Input	
W572 (RG9B/U)	Connection for by-pass- ing low pass filter in parametric amplifier no. 2	Preselector	Output	Parametric amplifier	Input	
W573 (RG9B/U)	Connection for by-pass- ing low pass filter in parametric amplifier no. 3	Preselector	Output	Parametric amplifier	Input	
W574 (RG9B/U)	Connection for by-pass- ing low pass filter in parametric amplifier no. 4	Preselector	Output	Parametric amplifier	Input	

Table 2-3. Cable Requirements (configurations B and C)

## Power Amplifier Van to Diesel Generator Van

Cable	Use	Unit	Terminal	Unit	Terminal	Length
1036-300C6-1 (4/0 AWG, type G, 3 conductors)	Ac input power	Power output box	J2	Power entrance box	J416	125
1036-300C6-2 (300MCM, type G, 3 conductors)	Ac input power	Power output box	J1	Power entrance box	J415	125

## Power Amplifier Van to Operations Van

1036-300C1-1 (25 pairs no. 19 AWG)	Fault indications	Signal line extension box	J407	Signal line extension box	J507	20
1036-300C1-2 (25 pairs no. 19 AWG)	Fault indications	Signal line extension box	J406	Signal line extension box	J506	20
1036-300C2* (30 conductors no. 12 AWG)	Parametric amplifier to exciter	Signal line extension box	J408	Signal line extension box	J508	20
1057-300C1** (25 pairs no. 19 AWG)	Parametric amplifier to receivers	Signal line extension box	J408	Signal line extension box	J508	20
1036-300C3 (10 conductors no. 12 AWG)	Parametric amplifier to receiver and exciter	Signal line extension box	J405	Signal line extension box	J505	20
1036-300C4-1 (RG9B/U)	Parametric amplifier no. 1 to receiver no. 1	Signal line extension box	J401	Signal line extension box	J501	20
1036-300C4-2 (RG9B/U)	Parametric amplifier no. 2 to receiver no. 2	Signal line extension box	J402	Signal line extension box	J502	20



Table 2-3. Cable Requirements (configurations B and C) (cont)

Power Amplifier Van to Operations Van (cont)

Cable	Use	Unit	Terminal	Unit	Terminal	Length
1036-300C4-3 (RG9B/U)	Parametric amplifier no. 3 to receiver no. 3	Signal line extension box	J403	Signal line extension box	J503	20
1036-300C4-4 (RG9B/U)	Parametric amplifier no. 4 to receiver no. 4	Signal line extension box	J404	Signal line extension box	J504	20
RG9B/U	Test cable (not appli- cable to configura- tion C)	Signal line extension box	J420	Signal line extension box	J520	20
1036-300C4-5 (RG9B/U)	Parametric amplifier to exciter	Signal line extension box	J417	Signal line extension box	J517	20

\* Used for configuration B only

\*\* Used for configuration C only

## SECTION III

### INSTALLATION PROCEDURES

#### 2-25. VAN INSTALLATION.

#### 2-26. GENERAL.

2-27. The power amplifier van is brought to the site by a towing vehicle or other means of transportation and is positioned in place on hardstands. The position of the power amplifier van is determined by the location of the antenna systems. Figure 2-2 shows the relative positions of the vans at a typical terminal site. In addition, the power amplifier and operations vans must be positioned so that personnel platforms, air conditioning ducts, and vestibule passageways can be properly installed between the vans. After the van has been positioned, the towing vehicle must be removed and the van leveled on hardstands; the personnel platforms are then installed and the vestibule enclosure erected (required only in cold climates). Detailed installation procedures are contained in paragraphs 2-34 through 2-67.

#### 2-28. STOWED COMPONENTS.

2-29. The power amplifier van is shipped assembled except for certain stowed components which must be installed at the site. These items are packed in marked wooden transit cases (table 2-1), canvas bags, or are fastened by brackets to the van (refer to paragraph 1-24). The following precautions shall be observed when unpacking the stowed components:

#### CAUTION

Do not use excessive force to remove components from their stowed positions.

a. Exercise care when unpacking the components.

b. Check each component for proper identification (see table 2-1).

c. Inspect each component for physical damage. Report damage immediately to proper authorities.

d. Retain the original container and the special packing for the klystron tube and waveguide components for reshipment.

#### 2-30. REQUIRED TOOLS AND TEST EQUIPMENT.

2-31. Tools required during installation and test equipment needed for postinstallation alignment and testing of van equipment are listed in tables 1-3 and 1-4 of this manual and in the appropriate equipment technical orders.

#### 2-32. POSITIONING THE VAN ON HARDSTANDS.

2-33. The van is commonly installed on four identical steel-reinforced concrete hardstands (fig. 2-1). Equipment used to position the van onto the hardstands is determined by the terrain and equipment availability.

#### 2-34. RUNNING GEAR INSTALLATION.

2-35. The van is provided with eight retractable lifting eyes, four on each side of the van. These eyes permit handling of the van by one or more hoists. Perform the following procedure to install the running gear (refer to fig. 6-24 in Chapter 6).

a. Using an overhead hoist or two mobile hoists, raise the van to the proper height for the king pin to engage the fifth wheel of the tractor.

b. Back the tractor into position to engage the king pin. When the coupling is secure, remove the hoisting cables from the front end of the van.

**CAUTION**

The brake system on the trailer is disconnected. Do not couple brake hose at this time.

c. Raise the rear of the van slightly to permit installation of the running gear.

**CAUTION**

To avoid damage to the king pin fifth wheel coupling, do not raise the van higher than necessary to accomplish step d.

d. Position the running gear (wheels, axle, and spring assembly) as illustrated in figure 2-4.

e. Refer to fig 6-24 in Chapter 6 and secure the four spring blocks to the undercarriage frame with the 32 bolts and 32 lockwashers provided. It may be necessary to raise and lower the rear end of the van slightly to align the bolts and holes.

f. After checking that the running gear is securely attached, lower the van so that the tires are resting on the ground and remove the hoisting gear.

**2-36. BRAKE SYSTEM INSTALLATION.**

2-37. Position the brake system as illustrated in figure 2-4. Also, refer to the installation of brake system illustration in TM 11-5820-762-25P and perform the following procedure to install the van brake system:

- a. Install the emergency relay valve with hardware provided.
- b. Connect the two flexible air hoses to the side (delivery) ports on the emergency relay valve.
- c. Position the air reservoir with the moisture drain cock toward the curbside wall of the van and at the lowest point on the tank.
- d. Secure the air reservoir with the brackets and hardware provided.
- e. Connect the 3/8-inch air line between the air reservoir and the port on the curbside of the emergency relay valve.

f. Connect the two 1/4-inch lines to the emergency relay valve.

g. Install the two rear air hose couplers.

h. Check the following:

- (1) Rear air hose coupler dust covers should be in place.
- (2) Rear air line shut off valves (forward of the coupler mounting bracket) must be closed.
- (3) Air reservoir moisture drain cock must be closed.

i. Couple the tractor air lines to the trailer.

**WARNING**

Check all connections for tightness before using van brakes.

**2-38. LANDING GEAR.**

2-39. The landing gears support and provide level adjustments for the front end of the van when it is detached from the prime mover.

**WARNING**

Do not disconnect the van from the prime mover before you have lowered the landing gears.

If the van landing gears and supporting braces have been removed for shipment purposes, install them in the following manner (fig. 2-5):

- a. Place the landing gear strut in a vertical position and loosely secure it to the undercarriage with the nine mounting bolts, nuts, and washers provided.

**NOTE**

Installation hardware is normally secured to the main associated component.



b. Place the side brace in the socket on the strut, and secure it loosely with the bolt, nut, and lockwasher.

c. Loosely secure the upper end of the side brace to the van frame with the bolt, nuts, and lockwasher.

d. Remove the crank handle from its mounting bracket.

e. Loosely secure one end of the diagonal brace to the strut, and fasten the other end to the van frame. Secure this brace tightly with one bolt, two nuts, and two lockwashers.

f. Tighten securely the attaching hardware that was installed in steps a through d.

g. If the landing gear shoe has been removed, install it on the landing gear extension.

## 2-40. LEVELING.

2-41. To level the power amplifier van, perform the following procedures:

a. Remove the landing gear crank handle from its support (fig. 2-5).

## CAUTION

To avoid damage to the van and equipment, carefully read the landing gear instruction plates attached to either side of the van near the landing gear control crankshafts.

b. Push the crank handle onto the landing gear control crankshaft until the crank handle engages the pin.

## NOTE

When the landing gear crank handle is inserted in the gear box the full limit, the gear box will operate the landing gear through low speed travel. High speed travel adjustments to the landing gear are made by removing the landing gear crank handle to the outer position.

c. Set the ratchet on the crank handle shaft and rotate the crank handle counterclockwise until the landing gear pad is firmly seated on the ground.

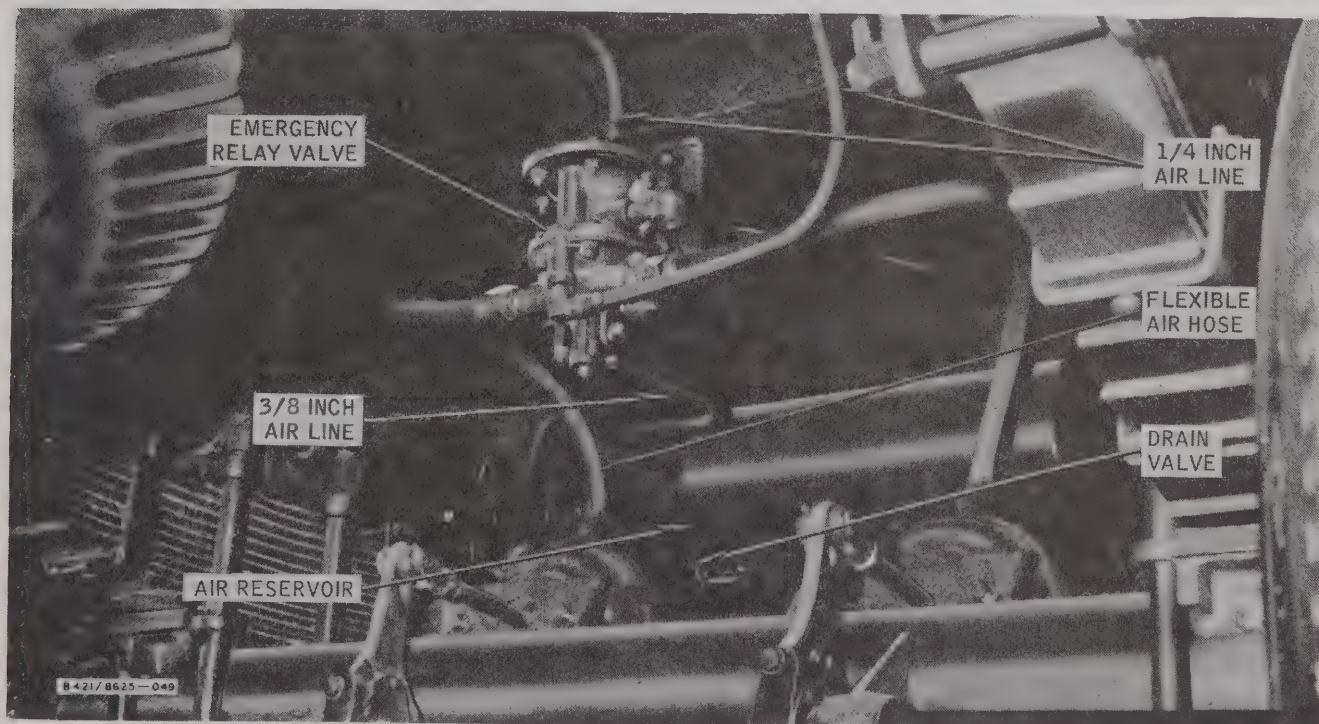


Figure 2-4. Brake System

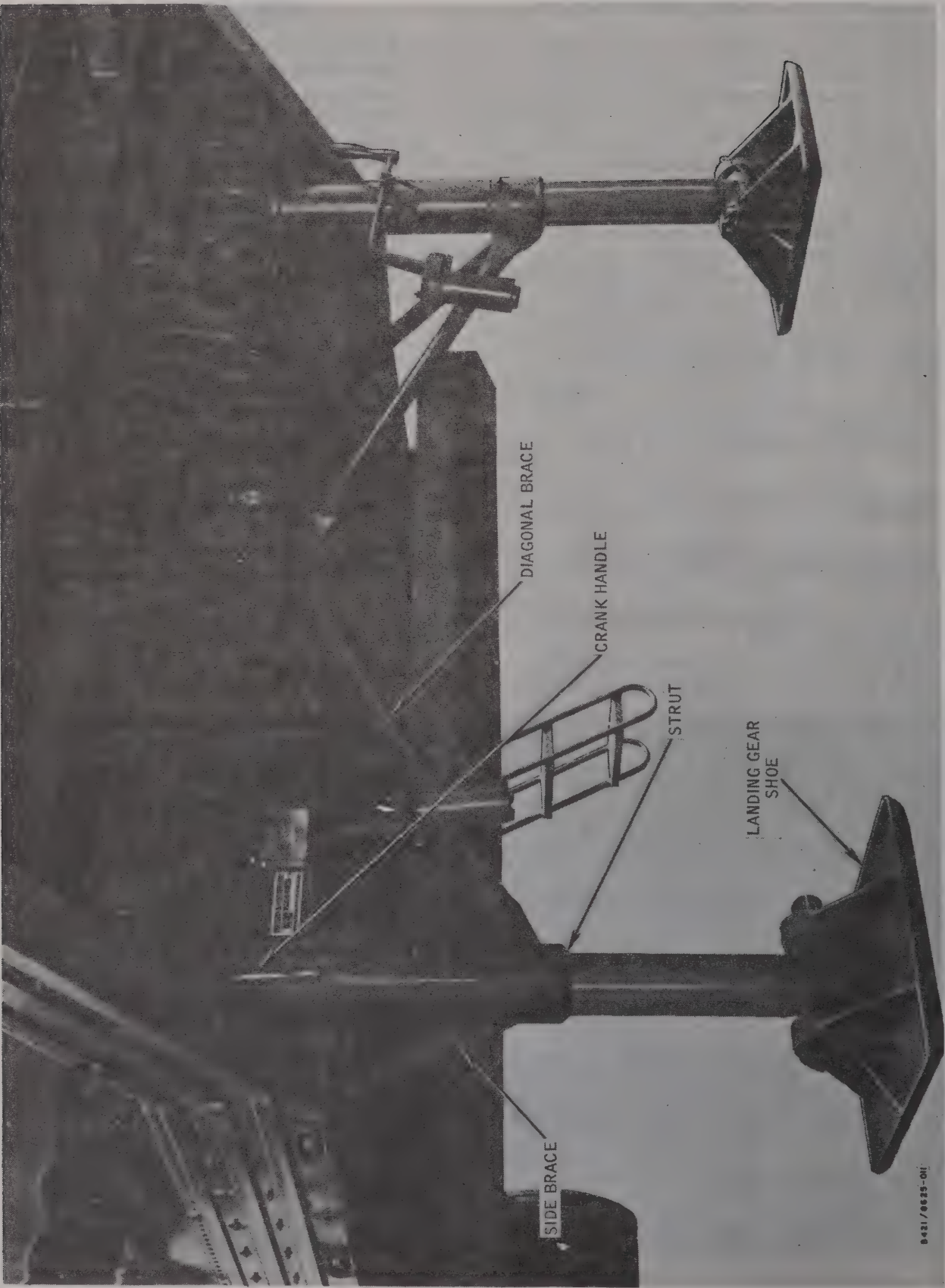


Figure 2-5. Landing Gear Installation

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d. Repeat steps a through c for the other landing gear.

### WARNING

Insure that both landing gear pads are resting firmly on the ground and wheel chocking blocks are in place before performing the following procedures.

e. Operate the air brake controls in the prime mover to apply the brakes of the van.

f. Close the shutoff cocks on the SERVICE and EMERGENCY air lines at the rear of the prime mover.

g. Uncouple the two air brake hoses from the SERVICE and EMERGENCY hose couplings at the front of the van.

h. Fit dummy couplings onto the van hose couplings to prevent dust and dirt from entering the air line system.

i. Disconnect the intervehicle cable from the electrical connector at the front of the van.

### CAUTION

At least two persons should be employed when removing the prime mover from the power amplifier van.

j. Release the king pin from the prime mover fifth wheel jaws by pulling out the jaw lock handle.

k. Pull the prime mover straight away from the power amplifier van.

l. Remove the chain attached quick release pins holding the leveling jack diagonal brace in towards the rear center of the power amplifier van (fig. 2-5 and fig. 2-6).

m. Slowly lower the leveling jack.

n. Remove the rear quick release pin holding the side brace and allow the side brace to swing down from its stowage position. Attach the side brace to the angle bracket of the leveling jack with the quick release pin (fig. 2-7).

o. Swing the rear brace up and secure it with its quick release pin.

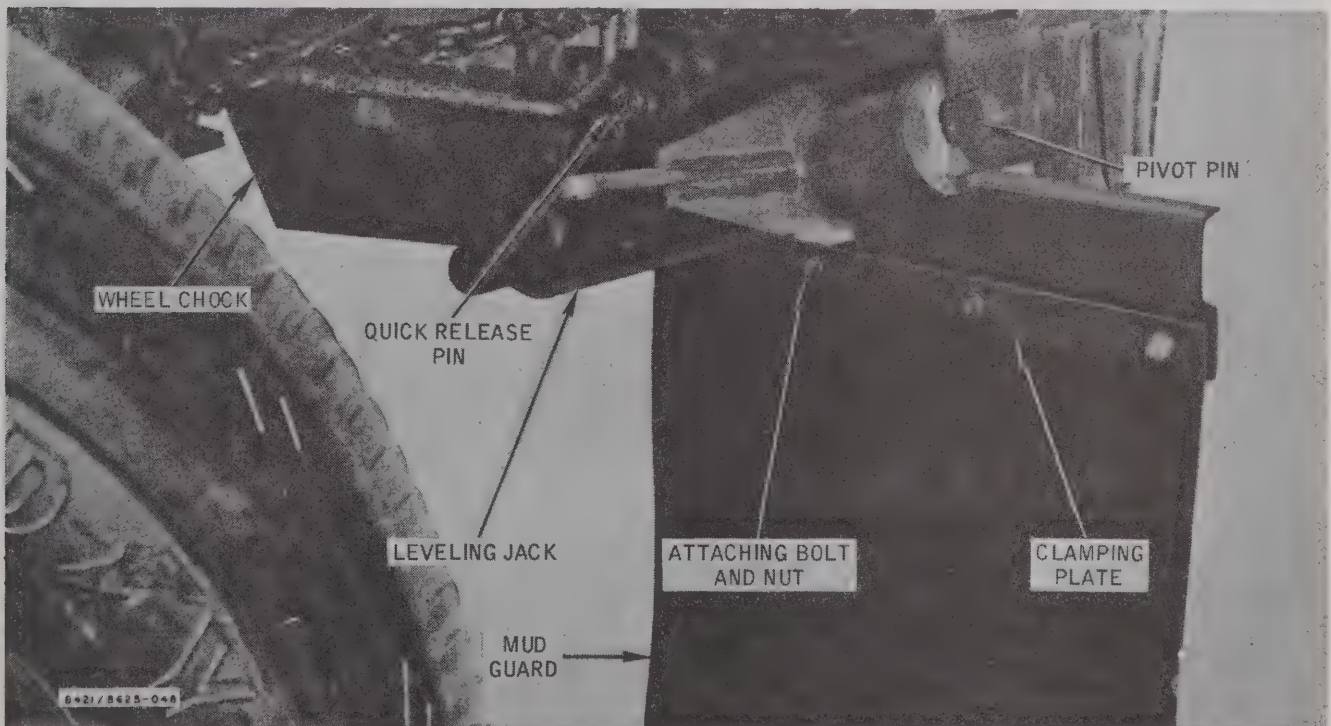


Figure 2-6. Leveling Jack Installation (Stowed Position) and Mud Guard



p. Remove a leveling jack bar from the tool box located on the curbside of the skid base.

q. Remove a leveling jack shoe from its stowage position on top of the skid base towards the rear roadside of the operations van.

r. Center the leveling jack shoe directly under the leveling jack screw and turn the leveling jack bar until the leveling jack screw is firmly seated in the leveling jack shoe.

s. Insert the leveling jack bar through the slot in the leveling jack screw and turn the leveling jack bar until the leveling jack screw is firmly seated in the leveling jack shoe.

t. Repeat steps e through s for the other leveling jack.

u. While observing the bench levels, adjust the two leveling jacks and two landing gears until the power amplifier van is level.

#### NOTE

Bench levels are located near each of the landing gear control crankshafts and one on the front and rear center exterior of the operations van.

v. Return the crank handles and jack bars to their stowage positions.

#### 2-42. VAN COMPONENT INSTALLATION.

#### 2-43. PERSONNEL PLATFORMS.

2-44. To install a vestibule curbside personnel platform on the power amplifier van, or to erect the passageway platform on the roadside entrance way of the power amplifier van, proceed as follows (fig. 2-8):

#### NOTE

Two persons should be employed when installing the platform.

a. Remove the platform from its stowed position underneath the van.

#### WARNING

To avoid possible injury to personnel, make sure that the platform is held securely in place.

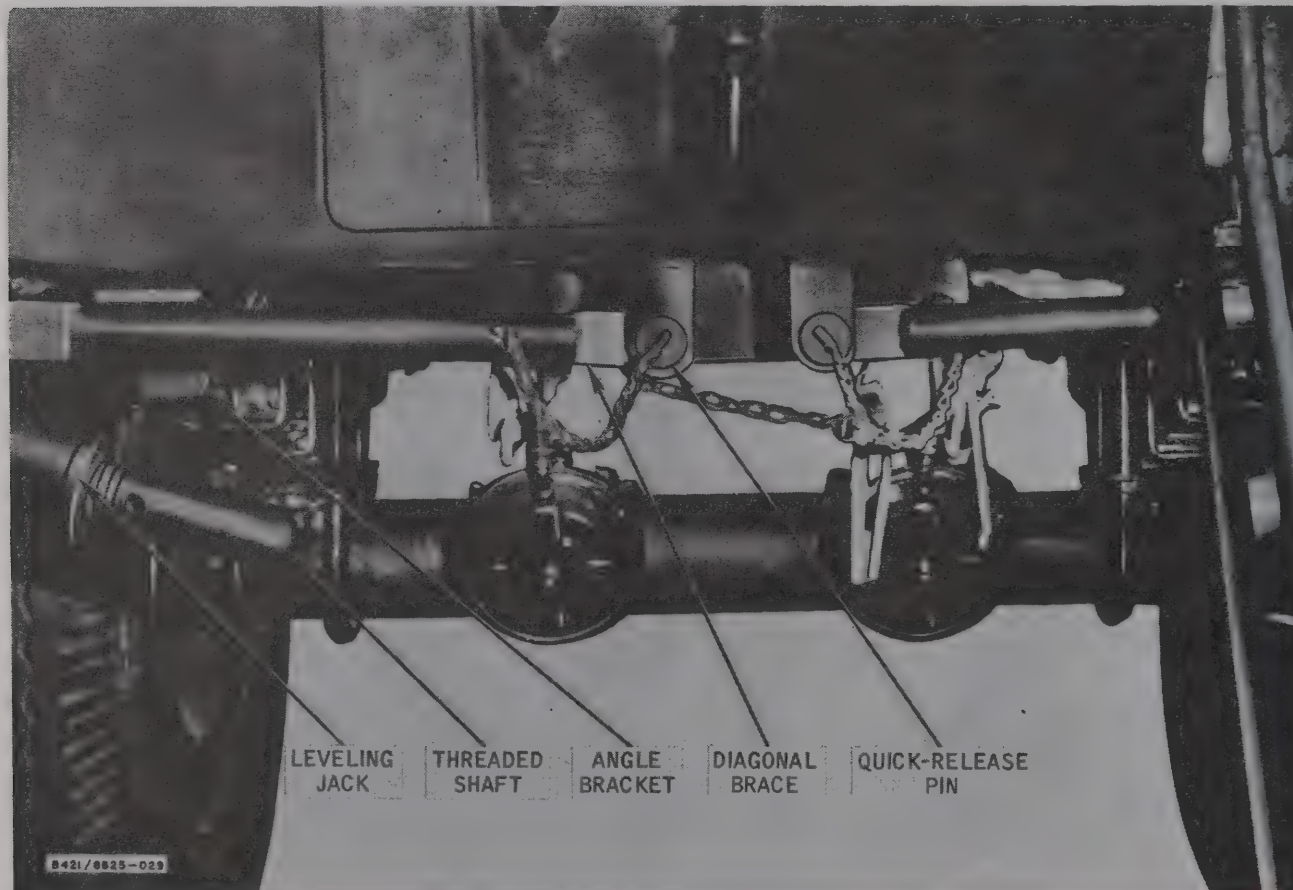


Figure 2-7. Adjustment of Leveling Jack

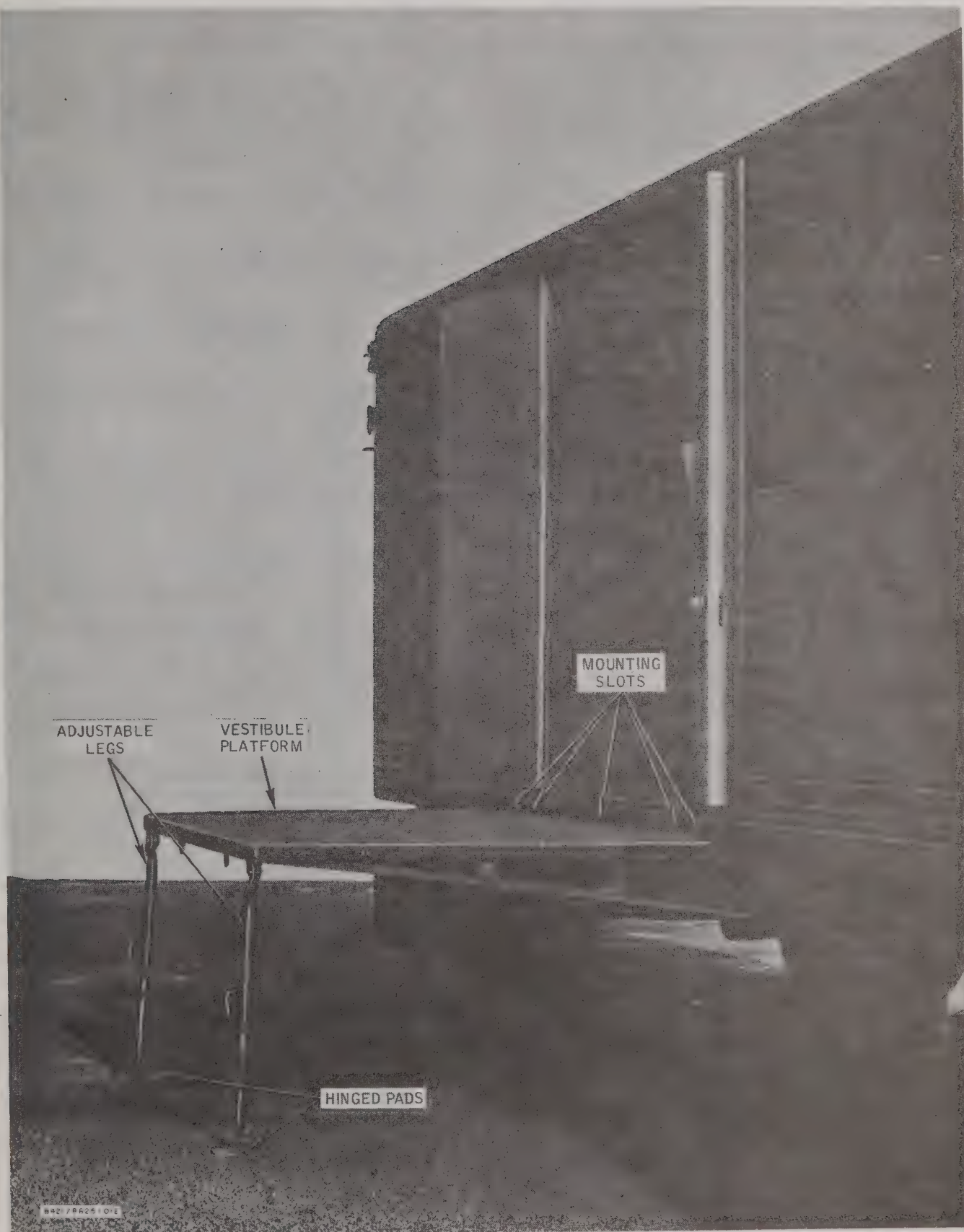


Figure 2-8. Installation of Personnel Platform



b. Position the platform against the van so that the platform lock pins engage the slotted holes below the doors of the van.

c. Slide the platform down until the lock pins fit into the slots.

d. Remove the pin securing one of the adjustable legs in a stowed position at the outside corner of the platform.

e. Lower the leg to a vertical position until the hinged pad rests securely on the ground.

f. Place the pin through the hole in the adjustable leg to lock the telescoping portion.

g. Repeat steps d through f for the other adjustable leg.

#### 2-45. PERSONNEL LADDERS.

2-46. To install a personnel ladder on either platform proceed as follows:

a. Remove a personnel ladder from its stowage position either underneath or on the right front door of the power amplifier van.

### WARNING

To avoid possible injury to personnel be sure that the ladder, when installed, is securely fastened to the platform and rests firmly on the ground.

b. Insert each lock assembly into corresponding holes in the side of the platform.

c. Turn the left hand lock assembly to the left and the right hand lock assembly to the right to secure the ladder to the platform. Be sure that the other end of the ladder rests firmly on the ground.

#### NOTE

When personnel platforms are not utilized, personnel ladders may be installed similarly to the sides of the van for boarding purposes.

#### 2-47. VESTIBULE ENCLOSURE.

2-48. To install the vestibule enclosure

around the curbside door or roadside doors, see figure 2-9 and proceed as follows:

#### NOTE

The top part of the vestibule enclosure consists of an inner roof frame (with mesh screen) and an outer roof frame.

a. Remove the framed roof and vestibule framing stowed in the power amplifier van.

b. Insert the two end supports into brass flanges on the ends of the personnel platform.

c. Insert the center support in its base flange in the center of the personnel platform.

d. Fit roof frame fittings onto the top of the support pipes.

e. Place the five hinged flanges of the roof frame into corresponding single mounting assemblies on the vestibule mounting frame (above the door) and secure with pins.

f. Slide the adjustable roof braces of the inner roof frame over the end support pipes.

g. Place the five hinged flanges of the inner roof frame into the corresponding mounting assemblies on the vestibule mounting frame and secure with pins.

#### NOTE

The three inner mounting assemblies are single type and the two outer ones are double type.

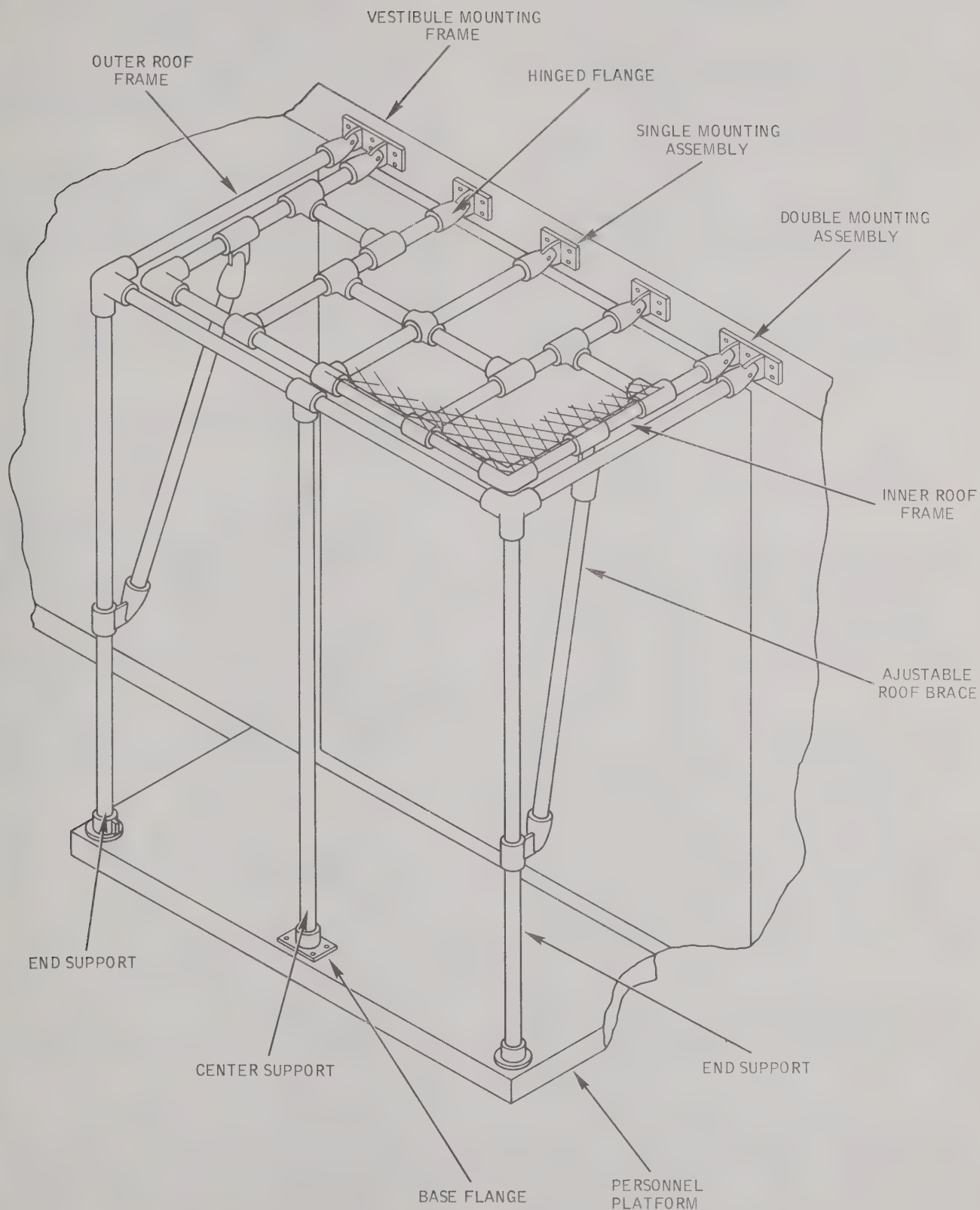
h. Place the outer roof frame fittings on top of the support pipes; place the two hinged flanges of the roof frame into the outer mounting assemblies and secure with pins.

i. Set the inner roof frame in the same horizontal plane as the outer roof frame and lock the adjustable roof braces in position on the end support pipes.

j. Set the inner roof frame in the same horizontal plane as the outer roof frame and lock the adjustable roof braces in position on the end support pipes.

k. Place the canvas arctic covering over the roof frame and around the framing struc-





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Figure 2-9. Vestibule Enclosure Framing Structure

ture. These coverings for the vestibules are stowed in canvas bags in the power amplifier van.

1. Fasten the covering loops to the studs on the vestibule mounting frame around the curbside doors and to studs around the personnel platform.

## 2-49. INTERCONNECTING AIR CONDITIONING DUCTS.

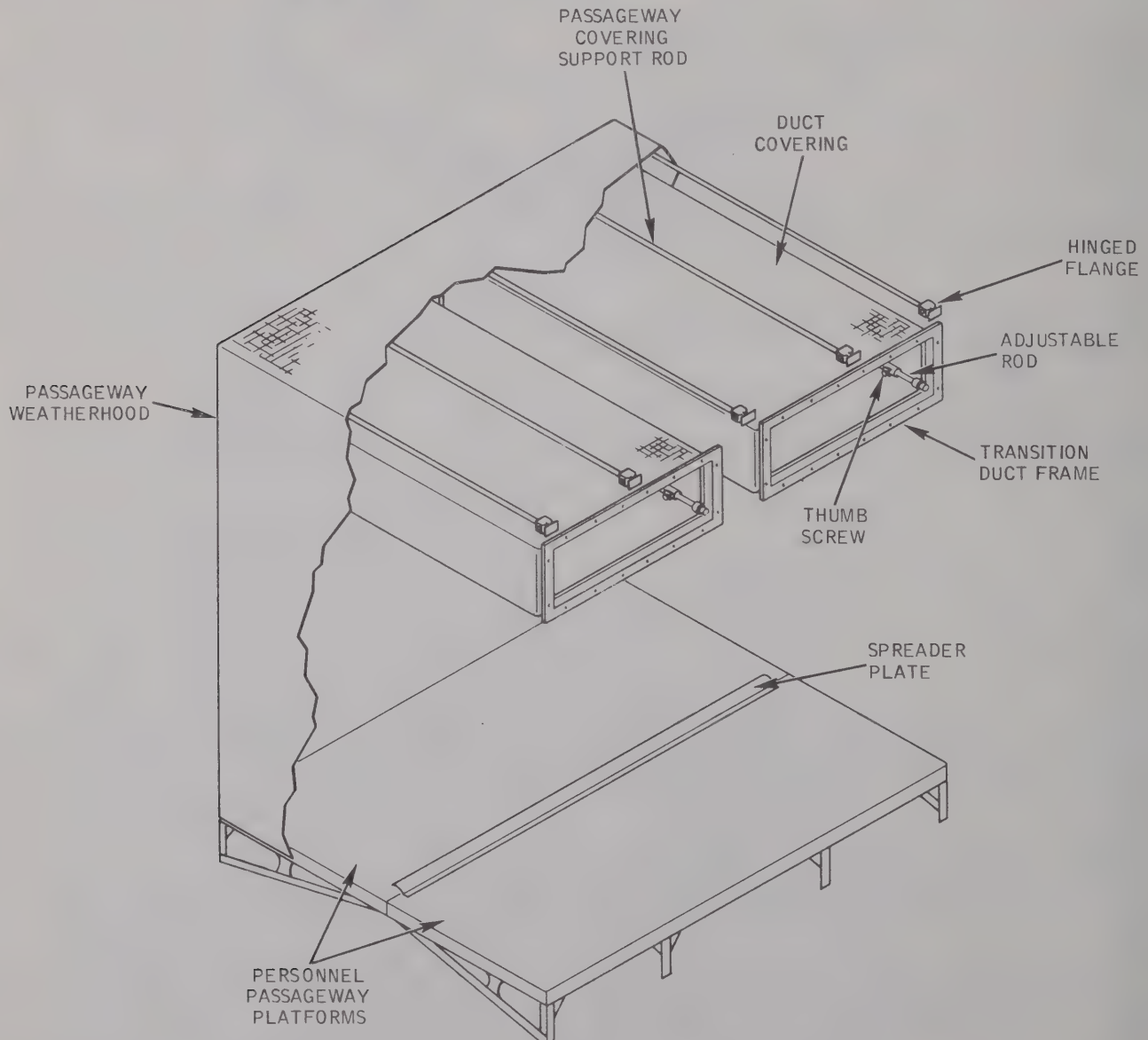
2-50. To install the air conditioning ducts between the power amplifier and operations vans, see figure 2-10 and proceed as follows:

### NOTE

At least two persons should be employed when installing the air conditioning ducts.

a. Remove the four transition duct frames stowed in the inside walls of the front doors of the van.

b. Loosen the half-turn fasteners in the covers of the air conditioning ducts on the rear of the operations van and above the roadside doors of the power amplifier van. Remove covers.



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Figure 2-10. Interconnecting Air Conditioning Ducts

c. Stow the covers on the inside of the front doors of the power amplifier van and secure each cover with straps.

d. Remove the 10 adjustable rods which are stowed in canvas bags on top of the roadside air conditioner.

e. Remove the duct coverings stowed in two canvas bags near the front of the power amplifier van.

f. Loosen the thumbscrew of each adjustable rod.

g. Place five adjustable rods between the two duct frames and in corresponding sockets in each frame.

h. Measure the shortest distance between corresponding corners of the air conditioning ducts on each van.

i. Adjust the length of each rod so that the outside dimensions of corresponding corners of the frames are the same as the measurement obtained in step h. Tighten the thumbscrew of each rod.

j. Wrap the duct covering around the adjustable rods and duct frames, and secure it in place.

k. Lift the air conditioning duct into position so that the frames are flush with the duct openings in the walls of the vans.

#### NOTE

It may be necessary to readjust the five rods to achieve flush mountings.

l. Tighten the half-turn fasteners in each frame to secure the frame to the vans.

m. Install the other interconnecting air conditioning duct as described in steps f through l.

#### 2-51. PASSAGEWAY WEATHERHOOD.

2-52. After the personnel platform and air conditioning ducts have been installed between the power amplifier and operations vans, refer to figure 2-10 and install the passageway weatherhood as follows:



At least two persons should be employed to install the passageway weatherhood.

a. Remove the weatherhood from the canvas bag at the front of the power amplifier van.

b. Remove the five passageway canvas support rods stowed in a canvas bag at the rear of the diesel generator van.

c. Place the hinged flanges of each support rod into the corresponding single mounting assemblies on the passageway frame mounting plate of each van and secure with pins.

#### NOTE

The five rods are evenly spaced above the top of the air conditioning ducts.

d. Place the weatherhood over the support rods and fasten it to the studs on the passageway frame mounting plate (around the doors) and to studs on the passageway platforms.

#### 2-53. WAVEGUIDE INSTALLATION (CONFIGURATIONS A AND B).

2-54. The waveguide installation for the roof top of the power amplifier van (configurations A and B) consists of waveguide mounting assemblies, diplexers and receive filters, as well as the waveguide sections. These assemblies are stowed in the power amplifier van. The sections of waveguides are fastened to mounting brackets when stowed in the van. These mounting brackets are also used to fasten the waveguide sections for roof top installation.

2-55. WAVEGUIDE MOUNTING ASSEMBLIES. For the installation of waveguide mounting assemblies, refer to the appropriate illustration in TM 11-5820-762-25P and proceed as follows:

a. Install each of the 14 identical vertical support plates (7750556-501) and the two identical vertical support plates (7750556-502). Use 3/16 inch-16 capscrews, 3/8 inch split-lock washers, and 3/8 inch flat washers for mounting these plates.



b. Loosely secure two support brackets to the outside of the upper and lower section of each support plate with 3/8 inch split-lock washers and 3/8 inch-16 hex capscrews.

c. Install two side rails on each side of the mounting assemblies by securely fastening these rails to the support plates by brackets (step b).

d. Mount the six Unistrut support channels crossways between their respective siderails (bottom side to bottom side and so on) with 1/2 inch flat washers, 1/2 inch split-lock washers, 1/2 inch-13 spring nuts, and 1/2 inch-13 capscrews.

## 2-56. DIPLEXERS AND RECEIVE FILTERS.

To install the two diplexers and two receive filters, refer to the appropriate illustration in TM 11-5820-762-25P and proceed as follows:

### NOTE

Exercise care when handling the components of the diplexer and receive filter groups.

a. Remove the 12 Unistrut support channels (type P-5500) from the shipping crates. Each channel is 102 inches long.

b. Install three of the support channels over the existing holes on the lower side rails at the front of the van. Secure the support channels in place with 2-7/16 inch U-brackets (Versabar type 5547) and attaching hardware (1/2-13 x 1/4 inch hexhead capscrow and 1/2-13 spring nut, Versabar type VSN-1050).

c. Similarly install three of the support channels on the lower side rails at the rear of the van.

d. Remove a diplexer body, with transitions, from the crate.

e. Position the diplexer body with the antenna port facing to the rear on the center support channel at the rear of the van.

f. Insure that the diplexer is centered on the support channel and that the transitions are positioned for later attachment of the (3-1/8 inch) coaxial and receiving (1-5/8 inch) coaxial feed lines.

g. Secure the diplexer body to the support channel, using four hexhead screws (5/16-18 x

1 inch) and four nuts (Unistrut Type 5507 5/16-18). Mounting holes are available in the four supports located on the bottom side of the diplexer body.

h. Remove eight tuning stub assemblies (42496G1) from the crates.

i. Remove the flange covers from the ports on the diplexer body and from the tuning stub assemblies.

### NOTE

To facilitate tuning of the tuning stub assemblies, mount them so that the counters can be read from above the diplexer assembly.

j. Carefully align the flange of each tuning stub assembly (the tuning stub assemblies are interchangeable) with the flange of a port on the diplexer body. Secure with hardware removed from the flange covers. Using a torque wrench, apply 18 pound-feet of pressure to all attaching bolts.

k. Attach hanger assemblies to each tuning stub assembly and secure the hanger assemblies to the two outer support channels. The hanger assembly is secured to the Unistrut support channel with a screw (cap hexhead 5/16-18 x 1 inch) and nut (Unistrut type P-5507 5/16-18).

l. Remove a receive filter body, with E-plane bend and transition attached, from the crate.

m. Position the receive filter body on the center support channel at the front of the van. Insure that the antenna port on the E-plane bend is facing the front of the van; that the tuning probe assembly is located on the curb side of the van; and that the center line of the E-plane bend is directly above the center line of the van.

n. Secure the receive filter body to the support channel using four hexhead screws (5/16-18 x 1 inch) and four nuts (Unistrut type 5507 5/16-18). Mounting holes are available in the four supports located on the bottom of the receive filter body.

o. Remove four tuning stub assemblies (42270G1) from the shipping crates.

p. Remove the flange covers from the ports

on the receive filter body and from the tuning stub assemblies.

#### NOTE

To facilitate tuning of the tuning stub assemblies, mount them so that the counters can be read from above the receive filter assembly.

q. Determine from the code markings on each tuning stub assembly the port to which it will be attached.

r. Carefully align the flange of each tuning stub assembly with the flange of the appropriate port on the receive filter assembly. Secure with hardware removed from the flange covers. Using a torque wrench, apply 18 pound-feet of pressure to all attaching bolts.

s. Attach hanger assemblies to each tuning stub assembly and secure the hanger assemblies to the two outer support channels. The hanger assembly is secured to the Unistrut support channel with a screw (cap hexhead 5/16-18 x 1 inch) and nut (Unistrut type 5507 5/16-18). Carefully tighten all bolts and nuts on the hanger assembly.

t. Install three of the support channels over the existing holes on the upper side rails at the front of the van. Secure the support channels in place with 2-7/16 U-brackets (Versabar type 5547) and attaching hardware (1/2-13 x 1/4 inch hexhead capscrew and 1/2-13 spring nut, Versabar type VSN-1050).

u. Similarly install three of the support channels on the upper side rails at the rear of the van.

v. Follow the instructions given in steps d through k and install the second diplexer assembly at the front of the van over the receive filter assembly.

w. Follow the instructions given in steps l through s and install the second receive filter assembly at the rear of the van over the diplexer assembly.

2-57. WAVEGUIDE SECTIONS. To install the waveguide sections, refer to the appropriate illustration in TM 11-5820-762-25P before proceeding as follows:

a. Loosen the screws on the two transit covers on the roof of the power amplifier van.

b. Remove one section at a time from waveguide stowage and install on the roof. A waveguide section is removed together with the Unistruts as a unit. Use the hardware that was used for stowage to mount these waveguide sections.

#### CAUTION

Use extreme care when carrying waveguide sections, so as not to cause any dents.

c. Remove the transit covers and install the 1-5/8 inch and 3-1/8 inch coaxial stud roof plates (feedthroughs) which are stowed in a compartment type transit case.

d. Mount the remaining sections on the roof. Four 1-5/8 inch and two 3-1/8 inch rigid coaxial lines are stowed in specially designed framework in the operations van.

#### 2-58. WAVEGUIDE INSTALLATION (CONFIGURATION C).

2-59. To install the waveguides on the roof of the power amplifier van for configuration C, refer to figure 2-11, and proceed as follows:

#### NOTE

The two receive filters and the two associated diplexers are already installed in waveguide sections B and E and J and K, respectively.

a. Open the curbside door of the power amplifier van.

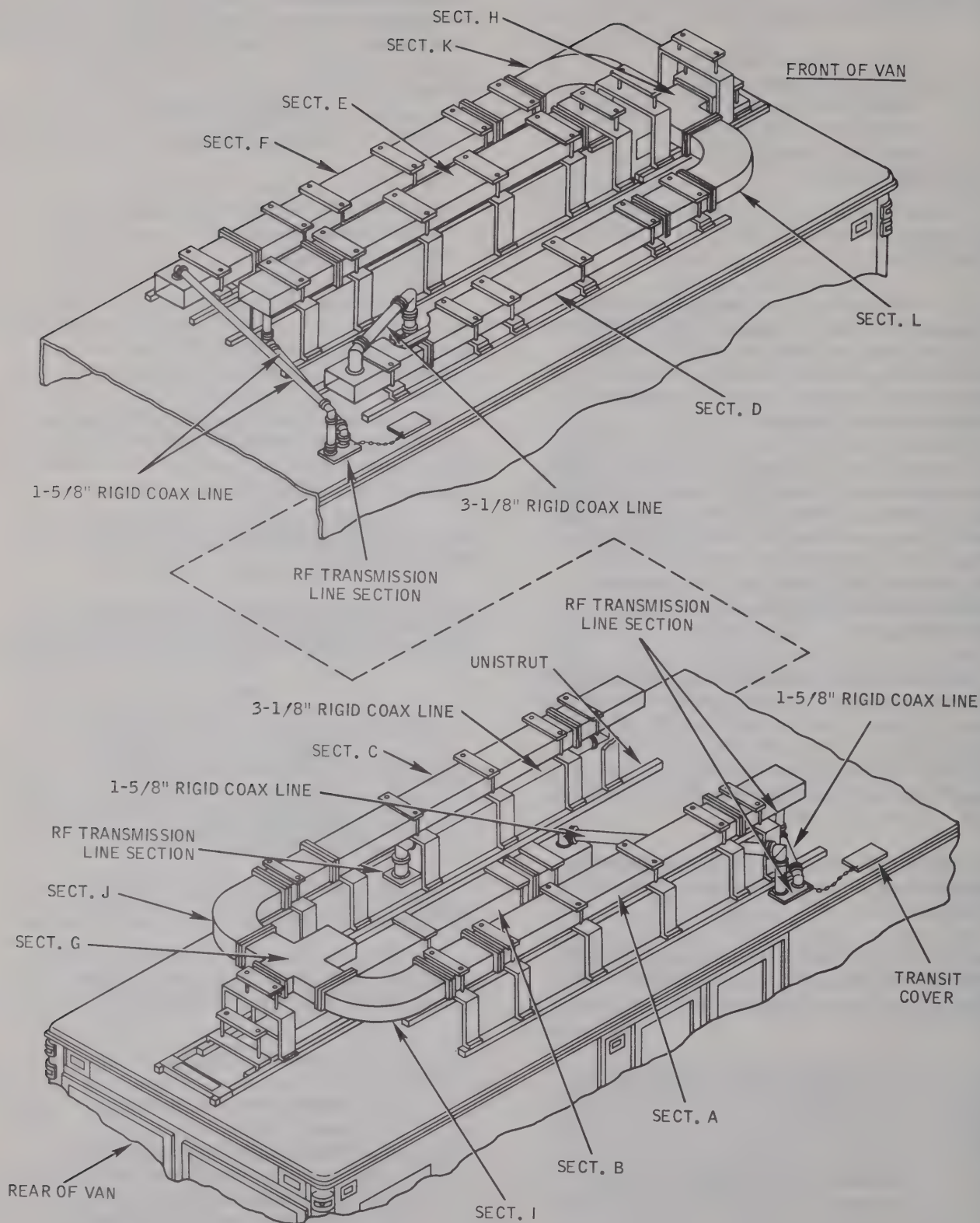
b. Remove the upper waveguide sections (J and K) from their supporting brackets by removing the attaching hardware.

#### NOTE

A waveguide section is removed together with the brackets and Unistruts as a unit. The attaching hardware used for stowage of the waveguide sections is also used to secure the sections to the roof of the van.

c. Loosen the knob and stub assembly from





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Figure 2-11. Waveguide Installation (Configuration C)



each flange of the upper supporting bracket and remove the brackets.

d. Remove the lower elbow waveguide sections (I and L) from their supporting brackets by removing the attaching hardware.

e. Remove the lower supporting brackets.

f. Remove the spare klystron carriage and dolly from the van.

g. Remove one section of waveguide at a time (starting at the top of a row) by loosening the knob and stud assembly that secures the Unistrut.

h. Mount the waveguide sections on the roof of the van.

#### NOTE

Remove the protective covers from the ends of the waveguide sections prior to connecting the sections together.

i. Remove the rigid coaxial sections from their stowage case in the operations van and install on the roof of the power amplifier van.

j. Connect the applicable rigid coaxial section to the waveguide inside the power amplifier van.

### 2-60. GROUND RODS.

2-61. The power amplifier van is supplied with two ground rods for lightning protection. These rods are electrically connected to the van. To install the ground rods, refer to figure 2-2 and proceed as follows:

a. Insure that the bronze coupled driving stud is securely screwed into one of the ground rods.

#### NOTE

The stud absorbs the driving blow as the rod is driven into the ground. The ground rod, threaded at either end, may be connected to another rod by means of a coupling to form one continuous conductor.

b. Check that the ground clamp is securely fastened to the tip of the ground rod.

c. Thread another ground rod into the upper end of the first ground rod to form a 10-foot assembly.

d. Place the point end of the assembly on the ground and drive the entire assembly into the ground.

e. Using the ground cable provided, connect the cable between the van and the ground clamp.

#### NOTE

The ground cable should be buried approximately 12 inches below the earth's surface and run out to its full length by placing the grounding assembly as far from the van and other grounding assemblies as possible. If necessary, the grounding procedure may be modified to suit the individual site.

### 2-62. TARPULIN SUNROOF.

#### NOTE

The tarp bow assemblies for the power amplifier van are higher than those on the diesel generator and operations vans. The additional height accommodates the waveguide installation on the roof of this van.

2-63. To install the tarpaulin sunroof on the power amplifier van, refer to figure 2-12 and proceed as follows:

a. Remove the tarpaulin sunroof and tarp bow assemblies from their stowage positions.

#### NOTE

The tarpaulin is stowed within the van and the tarp bow assembly is stowed underneath the van.

b. Remove the 12-foot ladder from its stowage position underneath the van and use it to gain access to the roof of the van.

c. Place one of the two curved tarp bow assemblies (with its curve facing outward) between the mounting blocks at the front of the van roof.

d. Position the hook assembly at each end of the tarp bow assembly so that its two locating pins and threaded fastener assembly engage corresponding holes in the mounting blocks.

e. Tighten the fastener assemblies securely to the mounting blocks.

f. Install the 13 straight tarp bow assemblies as described in the previous steps.

g. Install the other curved tarp bow assembly (curve facing forward) at the rear of the van roof as described in step c.

h. Position the folded tarpaulin at the front of the roof so that its front edge is paralleled with the front of the van.

i. Unfold the tarpaulin to permit securing its front edge along the front end of the roof.

j. Tie one end of the lashing rope to the tarp bow assembly hook at the right front corner of the van.

k. Alternately, loop the lashing rope through each of the grommets on the front edge of the tarpaulin and around the end (curved) tarp bow assembly.

l. Tie the other end of the lashing rope to the tarp bow assembly hook at the left front corner of the van.

m. Tie the rope extending from the center of the end (curved) tarp bow assembly to the hook assembly fastened at the roof line.

n. Using individual lashing ropes, fasten the edge of the tarpaulin through the grommets to the hooks on each side of the tarp bow assemblies; start at the front of the van.

o. Secure the rear edge of the tarpaulin to the rear end (curved) tarp bow assembly as described in steps j through m.

## 2-64. MUD GUARDS.

2-65. Perform the following procedures (fig. 2-6) to install the mud guards:

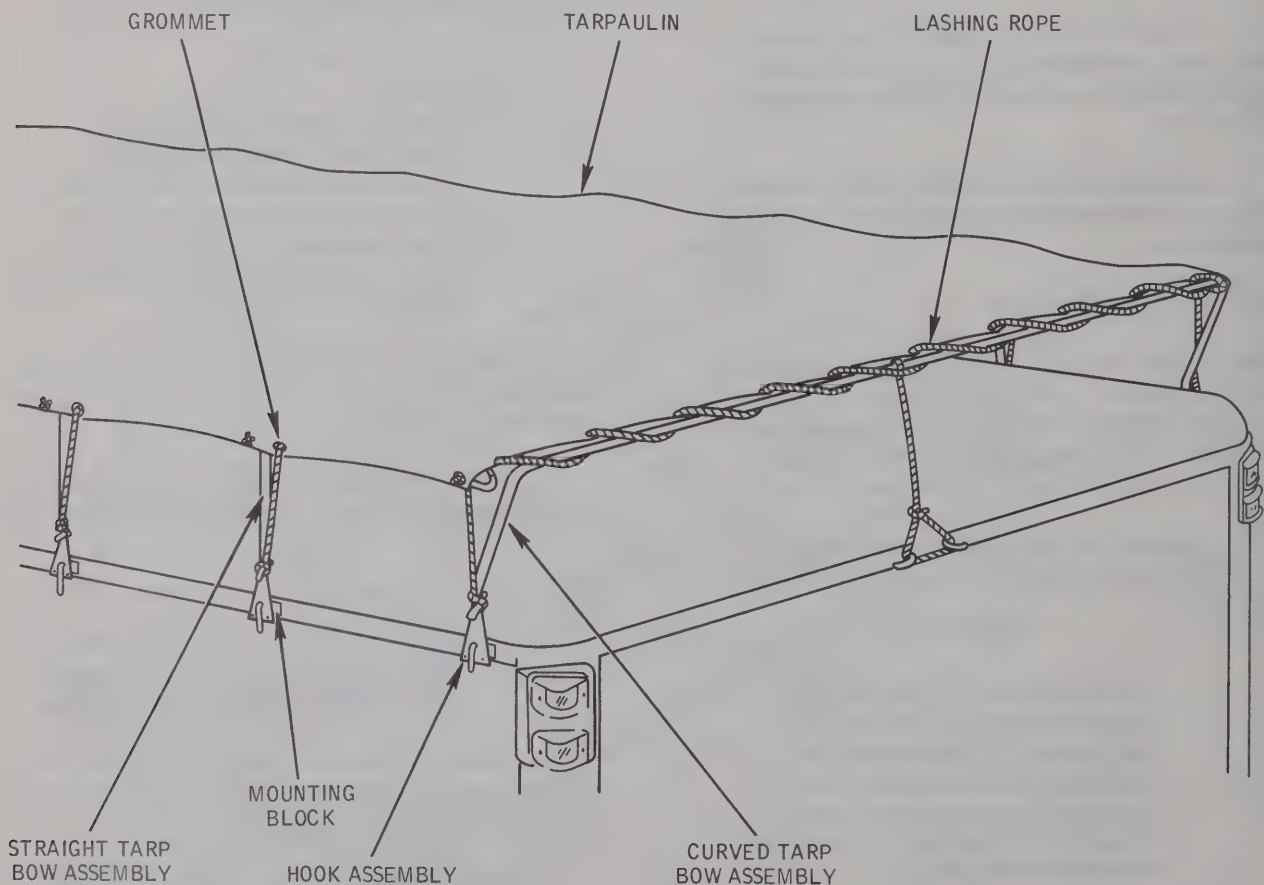


Figure 2-12. Tarpaulin Sunroof Installation

a. Position a mud guard onto the right gear frame of the van and align it up with the holes in the frame.

b. Position the clamping plate over the mud guard.

c. Insert the four attaching bolts from the rear of the van frame and secure the mud guard and clamp plate to the frame.

## 2-66. LEVELING JACK.

2-67. Perform the following procedures to install the leveling jacks:

a. Position the leveling jack as shown in figure 2-6. Attach the upper end of the jack with the pivot pin, then place the washer over the end of the pin and secure with the cotter key.

b. Secure the end brace and the strut in the stowed position with the captive quick release pins.

c. Repeat steps a and b for the other leveling jack.

## 2-68. KLYSTRON CARRIAGE INSTALLATION.

2-69. The klystron carriage in each 10-kw power amplifier must be assembled prior to operation. The spare klystron carriage, which is mounted on a dolly, must also be assembled. If one of the klystron carriages becomes inoperational, the spare shall be used as a replacement. To install a klystron carriage, see figure 2-13 and proceed as follows:

### CAUTION

At least three persons should be employed when assembling and installing the klystron carriage.

a. Open the curbside doors of the power amplifier van.

b. Slide the adjustable roof braces of the inner roof frame up on the support pipes and lock the roof in the raised position.

### NOTE

The inner roof frame is sufficiently raised to allow removal or installation of the klystron tube and associated components on the klystron carriage.

c. Remove the klystron carriage dolly tracks from the back of the amplifier section at the rear of the van.

d. Position the klystron carriage dolly tracks on the curbside platform and tighten the knob on each angle bracket until the tracks are securely fastened to the platform.

### NOTE

Steps e through g apply only to the klystron carriage in either amplifier section.

e. Remove the klystron carriage dolly from the rear of the amplifier section at the front of the van.

f. Roll the klystron carriage dolly to the base of the amplifier section.

g. Operate the trunk lock to lock the dolly in place.

h. Roll the klystron carriage from the amplifier section and lock it in place on the dolly with the dolly knob.

i. Refer to the appropriate technical order in removing the klystron carriage from its cabinet.

j. Release the dolly brake.

k. Roll the dolly containing the klystron carriage onto the dolly tracks on the curbside platform. The front of the carriage should face the power amplifier van.

l. Lock the dolly brake.

m. Remove a klystron tube and associated components from their transit cases stowed within the power amplifier van.

n. Assemble the klystron carriage as described in the appropriate technical order.

o. After the klystron carriage is assembled, roll the klystron carriage back to its particular section.

p. Install the carriage in its cabinet and make necessary connections as described in the appropriate technical order.

## 2-70. INTERCONNECTING CABLING.

2-71. The exterior power, signal, and rf



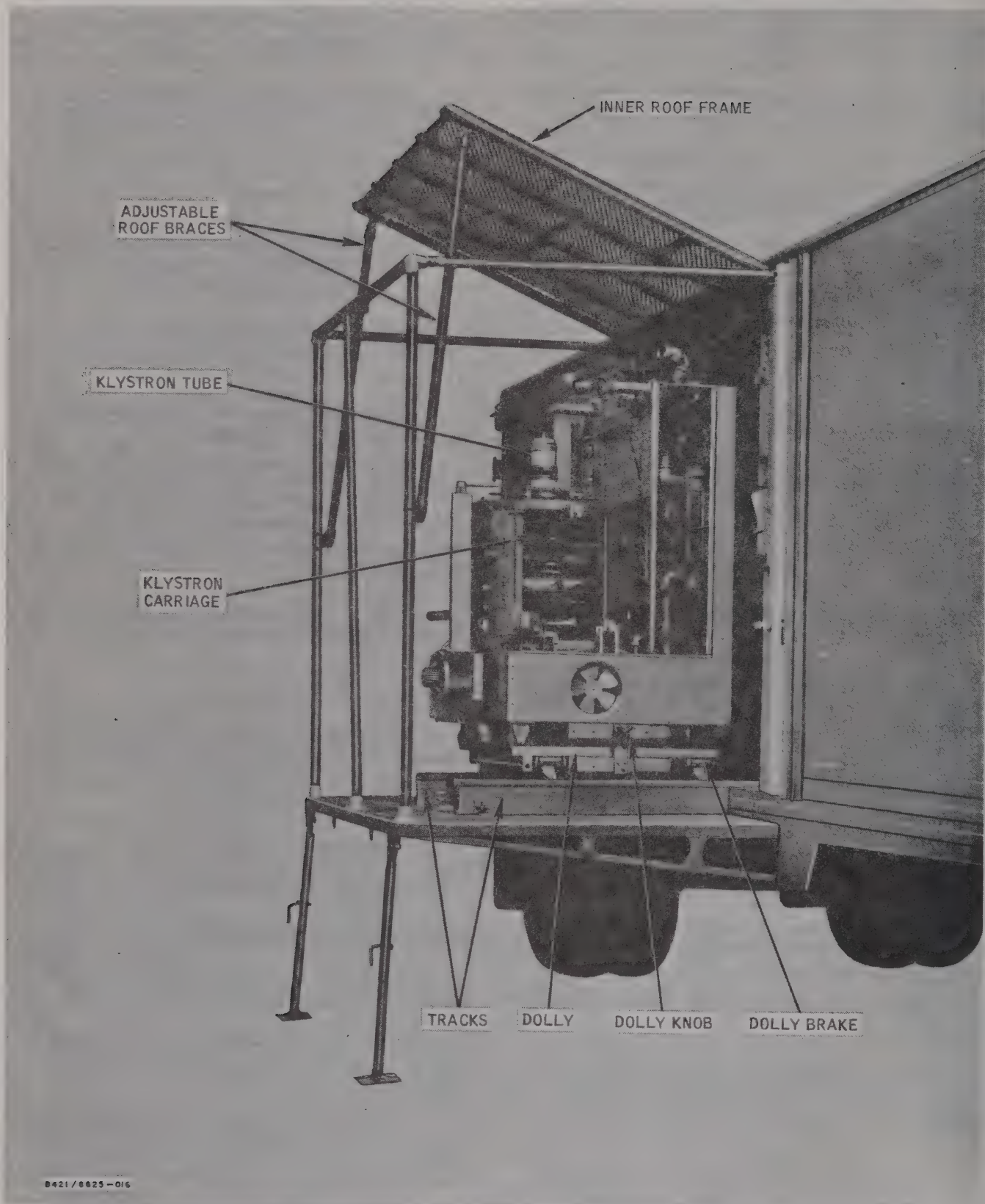


Figure 2-13. Installation of Klystron Carriage Assembly

cable connections between the power amplifier, operations, and diesel generator vans are listed in tables 2-2 and 2-3. The diesel generator van supplies 120/208-volt, 60-cycle, 3-phase, 4-wire electrical power from its power output box to the power entrance panel (fig. 2-14) on the power amplifier van. Signal cabling between the power amplifier and operations vans is connected to the respective van signal line extension box (fig. 2-15). RF coaxial cables (stowed in cabinet no. 3 in the operations van) are used to connect each parametric amplifier to its respective waveguide on the roof of the

power amplifier van. The circuit diagrams provided in Chapter 6 of this manual shall be used when making these cable connections.

## 2-72. POSTINSTALLATION TUNEUP AND TESTING.

2-73. There are no postinstallation tuneup and testing procedures for the power amplifier van. Procedures for the individual equipments are covered in separate equipment manuals. System procedures are covered in applicable system and facility manuals. (Refer to Appendix A).

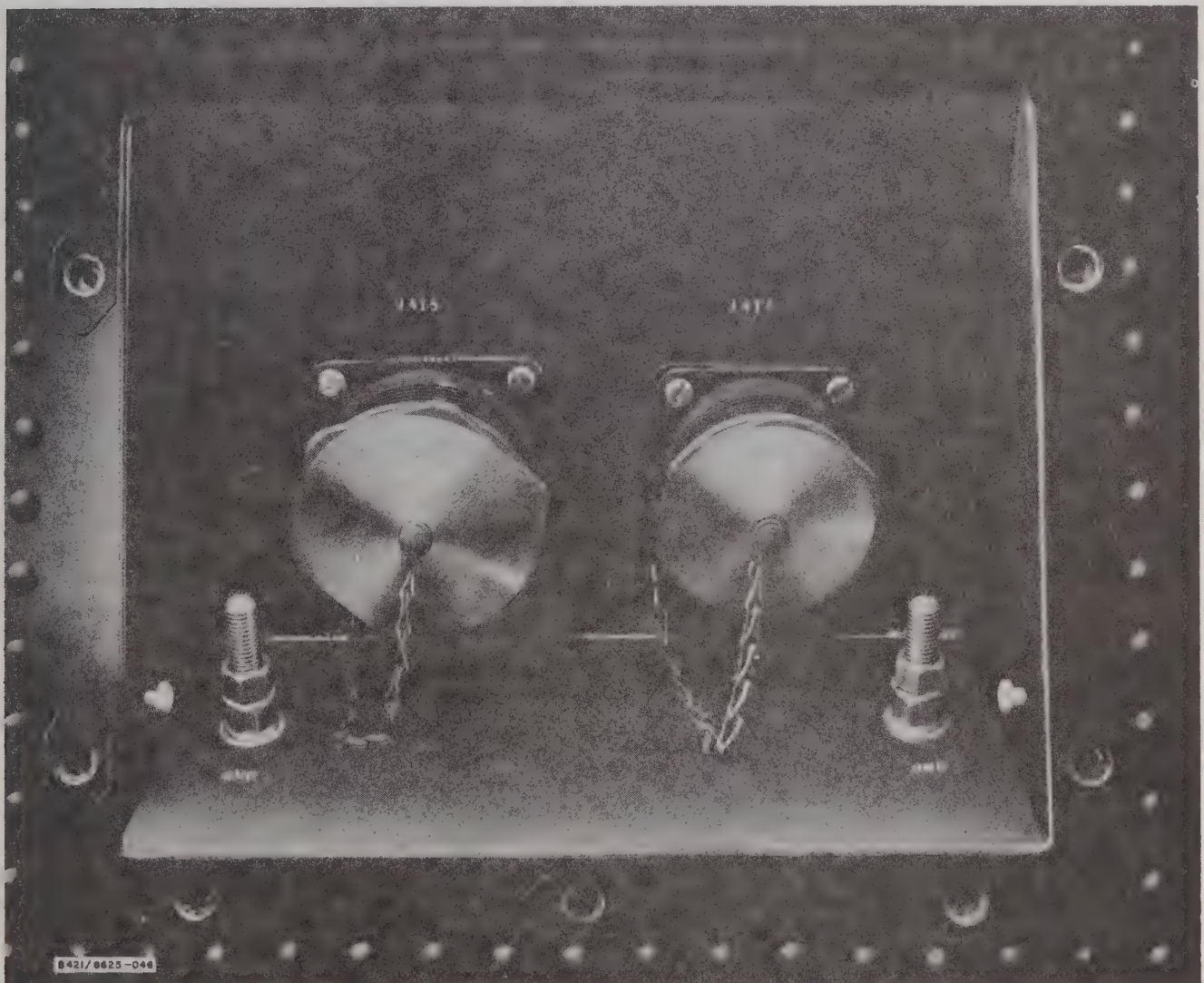


Figure 2-14. Power Entrance Box



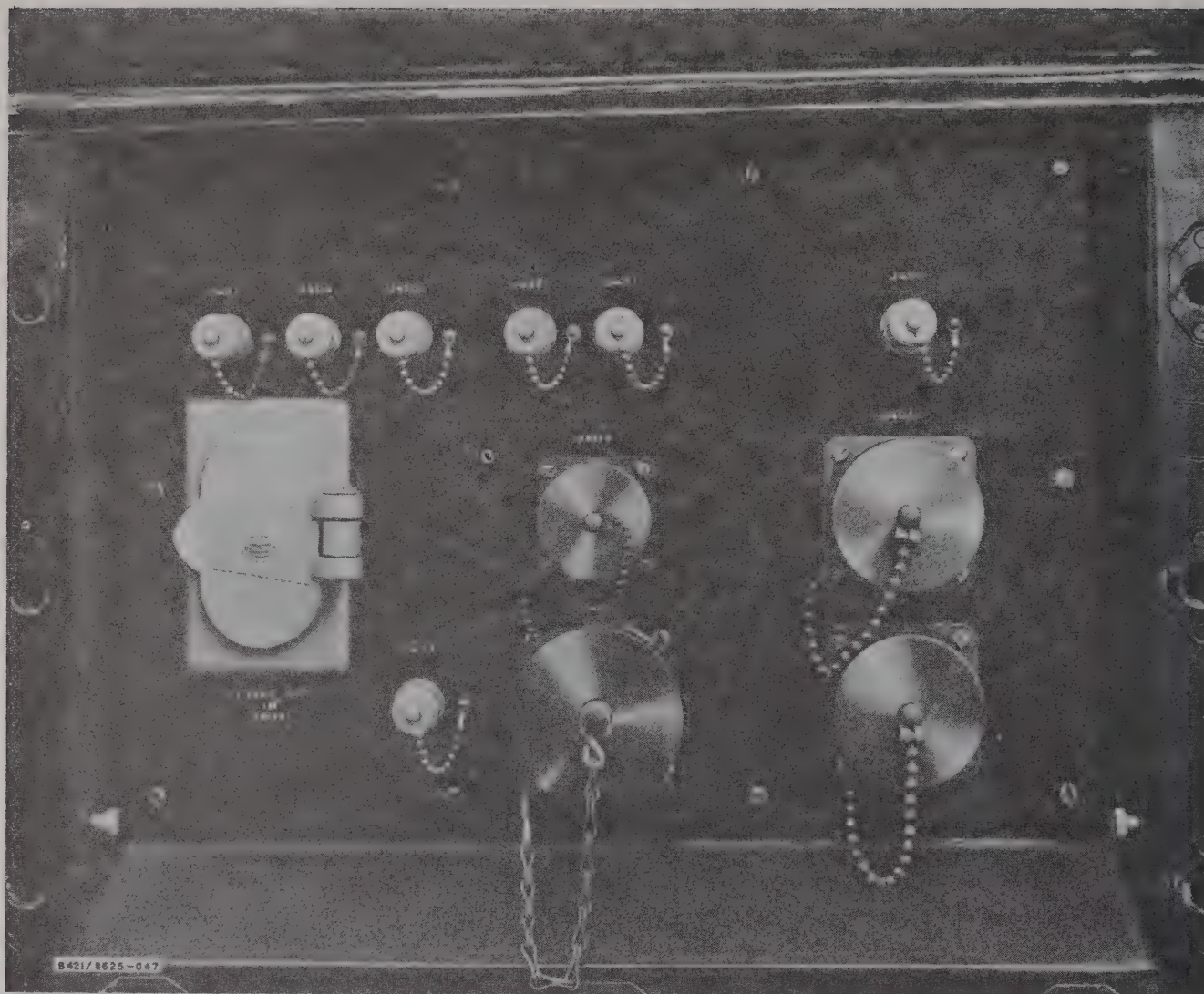


Figure 2-15. Signal Line Extension Box



## SECTION IV

### PREPARATION FOR RESHIPMENT

#### 2-74. GENERAL.

2-75. When preparing the power amplifier van for reshipment, all bolts and machine screws shall be tightened down to insure against damage due to loose components. A drying agent shall be included in each crate.

#### 2-76. DISASSEMBLY PROCEDURE.

2-77. The following disassembly procedure should be followed in preparing the power amplifier van for reshipment.

#### WARNING

Before starting the disassembly procedure, remove all primary power from the equipment.

- a. Place all equipment controls in the off position.
- b. Remove all cables from the equipment and roll them into neat coils for packing.
- c. Remove equipment installed by reversing the installation procedures found in paragraphs 2-43 through 2-67.
- d. Recrate the equipment and the associate cables in the reusable packing crates. Refer to table 2-1.
- e. Secure the crates in the approved manner for shipment.

#### 2-78. COUPLING SEMITRAILER TO TOWING VEHICLE.

2-79. To couple the semitrailer to the towing vehicle, proceed as follows:

- a. Remove the chock blocks from their

brackets and place them firmly behind the wheels on both sides of the semitrailer.

#### NOTE

Place an assistant at the semitrailer to guide the towing vehicle driver.

- b. Back the towing vehicle slowly to the nose of the semitrailer and align the king pin of the semitrailer with the fifth wheel (lower coupler) jaws of the towing vehicle. Just before the king pin (upper coupler) plate of the semitrailer starts to ride on the fifth wheel of the towing vehicle, stop the towing vehicle.

- c. Insure that the fifth wheel jaws are open by pulling out the jaw lockhandle. Slowly back the towing vehicle until the fifth wheel jaws engage the semitrailer king pin, locking automatically.

- d. Pull the towing vehicle forward with the semitrailer's brakes set to insure that the coupling is secure.

- e. Plug the intervehicular electrical cable from the prime mover to the nose of the semitrailer. Operate the lights from the towing vehicle to make certain they are in working order.

- f. Connect air line hoses between the semitrailer and the towing vehicle. Insure that the coupling of the towing vehicle marked SERVICE is hooked up to the coupling (bearing a similar tag) on the semitrailer. This is also essential in connecting the coupling tagged EMERGENCY between the two vehicles.

- g. Open the shutoff valve on the air lines of the towing vehicle. Apply the brakes to the semitrailer.

#### CAUTION

This operation locks the brakes on the semitrailer; failure to lock the brakes could result in damage to the landing gear.

## 2-80. REMOVAL OF UNDERCARRIAGE ASSEMBLIES.

### NOTE

It may be necessary to remove all or a portion of undercarriage subassemblies prior to shipment of the power amplifier van by rail, ship, land, or air.

### 2-81. BRAKE SYSTEM.

2-82. To remove the necessary components of the van air brake system, see figure 4-2, and proceed in the following manner:

### CAUTION

Insure that wheel chocking blocks are firmly in place before performing this procedure.

a. Open the drain cock on the air reservoir to depressurize the van air brake system.

b. Remove the two hose couplers at the rear of the van.

c. Remove the 3/8-inch air line between the air reservoir and the curbside port on the control valve.

d. Remove the two 1/4-inch air lines connected to the top and front of the emergency valve.

e. Remove the two flexible air hoses connected to the two side ports of the emergency relay valve.

f. Remove the emergency relay valve and retain the mounting hardware.

g. Remove the air reservoir and retain the mounting hardware.

h. Seal all openings of the air brake system components with moistureproof tape to prevent moisture and other foreign matter from entering the system.

### 2-83. RUNNING GEAR.

2-84. The van must be supported by a hoist to remove the running gear; four retractable lifting eyes on each side of the van are provided for this purpose. One overhead or two mobile hoists capable of lifting 18-1/2 tons must be used.

2-85. Remove the running gear in the following manner.

a. Using the hoist(s), raise the van slightly to remove the weight from the undercarriage.

b. Remove the eight bolts attaching each of the four spring blocks to the frame of the van.

c. Remove the wheels, axle, and spring assemblies from the van and leave it supported for the performance of the remaining procedures.

### 2-86. LANDING GEAR.

2-87. Remove the landing gear from the van in the following manner (see fig. 2-5).

a. Lower the landing gear shoe, using the crank, until the pad rests on the ground.

b. Loosen the nine strut mounting bolts.

c. Remove the diagonal brace.

d. Remove the side brace.

e. Remove the nine strut mounting bolts and remove the landing gear.

f. Perform steps a through e with the other landing gear.

### 2-88. LEVELING JACK.

2-89. Remove the two leveling jacks from the rear of the van by reversing the installation procedures found in paragraph 2-67.

### 2-90. SPARE TIRE.

2-91. Remove the spare tire from the spare tire carrier in the following manner:

a. Remove the wheel nut wrench from the van tool box and place it on the hexhead of the spare tire carrier operating shaft.

### CAUTION

Insure that the locking pawl is firmly engaged.

b. Remove the two hex nuts attaching the wheel lifting plate.

c. Firmly grasp the wrench to keep the operating shaft from spinning, and disengage the locking pawl.

d. Using the wheel nut wrench, carefully lower the wheel to the ground.

e. Remove the wheel from the lifting plate.

f. Reel the lifting plate up to the spare tire carrier, and reinstall the two hex nuts removed in step b.





## CHAPTER 3

### OPERATION

3-1. **INTRODUCTION.** This chapter contains the instructions you will need to operate the power amplifier van facilities. This chapter is divided into two sections. Section I identifies and describes the controls and indicators applicable to operation of the van. Section II

describes the power on/off procedures for equipments within the van; this section also contains instructions for operating the semi-trailer. Section III describes emergency operation.

## SECTION I

### CONTROLS AND INDICATORS

#### 3-2. GENERAL.

3-3. Unless otherwise indicated, the controls and indicators for configurations A, B, and C are identical.

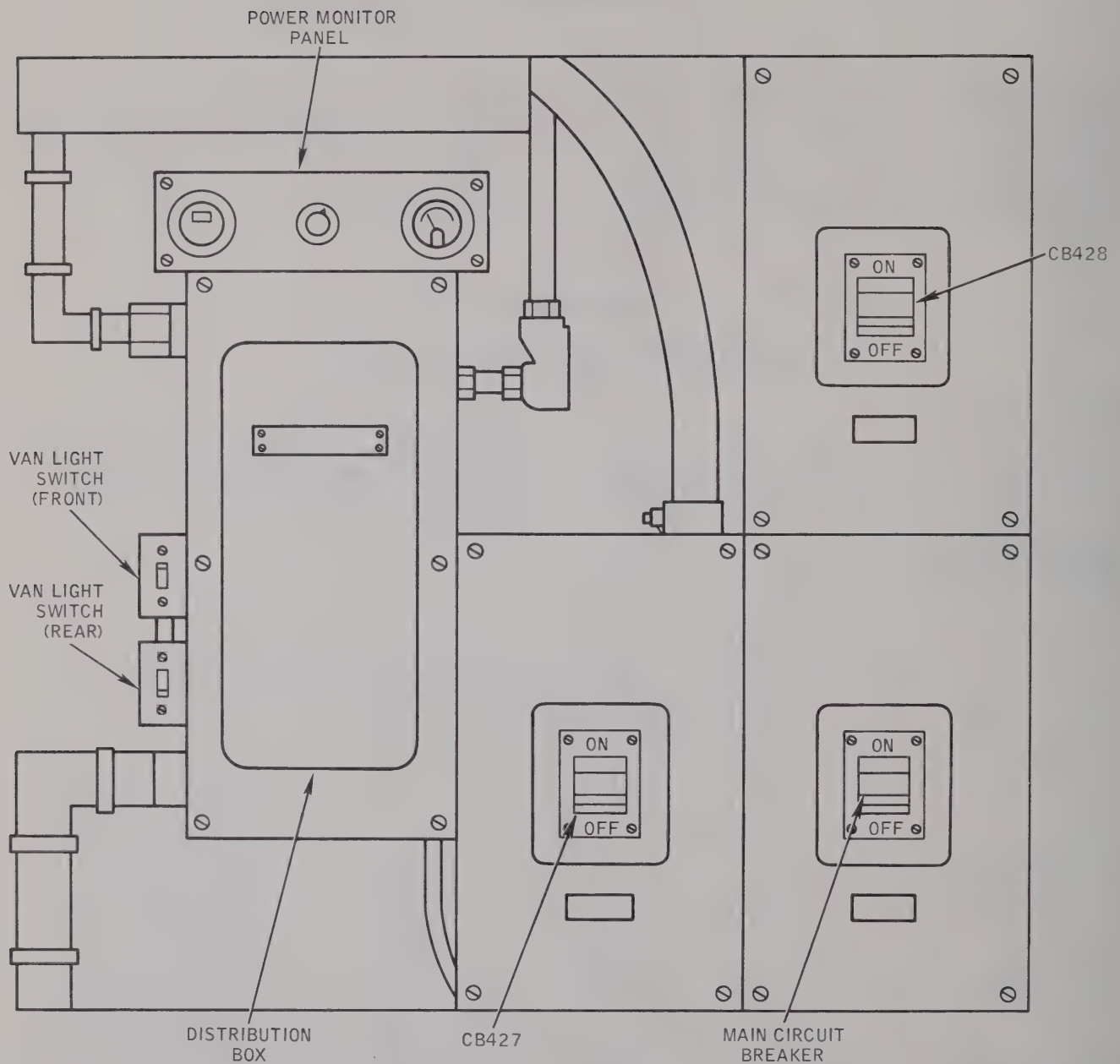
#### 3-4. IDENTIFICATION OF CONTROLS AND INDICATORS.

3-5. The controls and indicators of the power

amplifier van are described in figures 3-1 through 3-5 and tables 3-1 through 3-5. For illustrations and descriptions of individual components, refer to applicable equipment manuals.

Table 3-1. Power Amplifier Van, Roadside Wall, Power Control System (See fig. 3-1)

Name	Reference Designation	Function
Circuit breaker	CB428	Applies 120/208-volt, 60-cycle, 3-phase, ac power to 10-kw power amplifier no. 2
Main circuit breaker		Applies 120/208-volt, 60-cycle, 3-phase, ac power to van
Circuit breaker	CB427	Applies 120/208-volt, 60-cycle, 3-phase, ac power to 10-kw power amplifier no. 1
Van light switch (rear)	S403	Applies 120-volt, ac power to the rear row van lights and spotlights.
Van light switch (front)	S401	Applies 120-volt, ac power to the front row of van lights and spotlights



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Figure 3-1. Van Roadside Wall, Power Control System, Controls



Table 3-2. Power Amplifier Van, Distribution Box (fig. 3-2)

## CONFIGURATION\*

Index No.	A	B	C	Function
1.	Spare, circuit breaker no. 25	Dummy load, circuit breaker no. 11	Dummy load, circuit breaker no. 11	A: Spare B, C: Applies primary ac power to dummy load
2.	Heat exchanger no. 1, circuit breaker no. 19	Convenience outlets (exterior), circuit breaker no. 12	Convenience outlets (exterior), circuit breaker no. 12	A: Applies primary ac power to heat exchanger no. 1 B, C: Applies primary ac power to convenience outlets (exterior)
3.	Dehydrator, circuit breaker no. 15	Convenience outlets (interior), circuit breaker no. 14	Convenience outlets (interior), circuit breaker no. 14	A: Applies primary ac power to dehydrator B, C: Applies primary ac power to convenience outlets (interior)
4.	Dummy load, circuit breaker no. 11	Dehydrator, circuit breaker no. 15	Dehydrator, circuit breaker no. 15	A: Applies primary ac power to dummy load B, C: Applies primary ac power to the dehydrator
5.	Power section no. 2 (unreg.), circuit breaker no. 9	Heat exchanger no. 1, circuit breaker no. 19	Heat exchanger no. 1, circuit breaker no. 19	A: Applies primary ac power to power amplifier no. 2 B, C: Applies primary ac power to heat exchanger no. 1
6.	Power section no. 1 (unreg.), circuit breaker no. 7	Heat exchanger no. 2, circuit breaker no. 20	Heat exchanger no. 2, circuit breaker no. 20	A: Applies primary ac power to power section no. 1 B, C: Applies primary ac power to heat exchanger no. 2
7.	Van lights, circuit breaker no. 5	Antenna deicer no. 1, circuit breaker no. 25	Antenna deicer no. 1, circuit breaker no. 25	A: Applies primary ac power to van interior lights B, C: Applies primary ac power to antenna deicer no. 1
8.	Van lights, circuit breaker no. 3	Antenna deicer no. 2, circuit breaker no. 26	Antenna deicer no. 2, circuit breaker no. 26	A: Applies primary ac power to van interior lights B, C: Applies primary ac power to antenna deicer no. 2
9.	Spare, circuit breaker no. 1	Blank panel	Blank panel	A: Spare B, C: Blank panels
10.	Spare, circuit breaker no. 2	Blank panel	Blank Panel	A: Spare B, C: Blank panels
11.	Spare, circuit breaker no. 4	Blank panel	Blank panel	A: Spare B, C: Blank panels

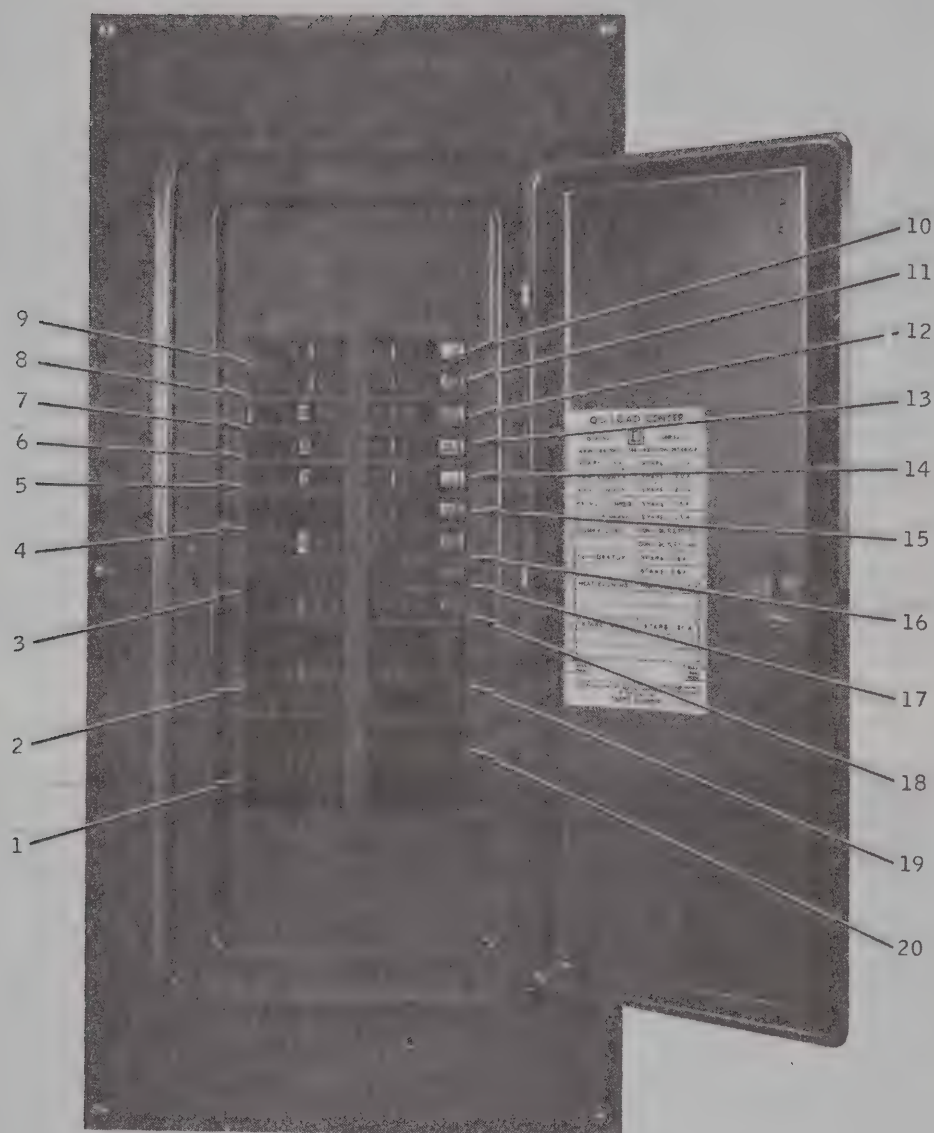
Table 3-2. Power Amplifier Van, Distribution Box (fig. 3-2) (cont)

## CONFIGURATION\*

Index No.	A	B	C	Function
12.	Spare, circuit breaker no. 6	Blank panel	Blank panel	A: Spare B, C: Blank panel
13.	Spare, circuit breaker no. 8	Van lights (front), circuit breaker no. 3	Van lights (front), circuit breaker no. 3	A: Spare B, C: Applies primary ac power to van lights (front)
14.	Spare, circuit breaker no. 10	Van lights (rear), circuit breaker no. 5	Van lights (rear), circuit breaker no. 5	A: Spare B, C: Applies primary ac power to van lights (rear)
15.	Convenience outlet	Power section no. 1	Power section no. 1	A: Applies primary ac power to convenience outlets (exterior) B, C: Power section no. 1 (unreg.)
16.	Convenience outlets (interior), circuit breaker no. 14	Blank panel	Parametric amplifier	A: Applies primary ac power to convenience outlets (interior) B: Blank panel C: Applies primary ac power to parametric amplifier control panel no. 1
17.	Spare, circuit breaker no. 16	Blank panel	Blank panel	A: Spare B, C: Blank panels
18.	Spare, circuit breaker no. 18	Blank panel	Blank panel	A: Spare B, C: Blank panels
19.	Heat exchanger no. 2, circuit breaker no. 20	Power section no. 2 (unreg.), circuit breaker no. 9	Power section no. 2 (unreg.), circuit breaker no. 9	A: Applies primary ac power to heat exchanger no. 2 B, C: Applies primary ac power to power section no. 2 (unreg.)
20.	Spare, circuit breaker no. 20	Blank panel	Parametric amplifier control panel no. 2, circuit breaker no. 10	A: Spare B: Blank panel C: Applies primary ac power to parametric amplifier control panel no. 2

\*A, B, and C identify the name and function of the circuit breaker, for each configuration.

NOTE: All circuit breakers have 400 added to their reference designation.



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Figure 3-2. Distribution Box (Located on Roadside Wall)



Table 3-3. Power Amplifier Van, Curbside Wall, Power Control System, Controls and Indicators (fig. 3-3)

Name	Reference Designation	Index No.	Function
24 VOLT EMERGENCY LIGHT switch	S401	1	Applies 24 volt, dc power to overhead emergency light
Van light switch	S402	2	Applies 24 volt, dc power, to the front row of van lights
Van light switch	S404	3	Applies 24 volt, dc power to the rear row of van lights

## Parametric Amplifier Control Panel No. 2

## Circuit Breakers and Indicator Lamps

PARAMETRIC AMPLIFIER NO. 4 POWER ON circuit breaker	CB2	4	Controls application of 120-volt, ac power to parametric amplifier no. 4
PARAMETRIC AMPLIFIER NO. 4 POWER ON DS2 lamp	DS2	5	Illuminates when circuit breaker CB2 is in OFF position
PARAMETRIC AMPLIFIER NO. 3 POWER ON circuit breaker	CB1	6	Controls application of 120-volt, ac power to parametric amplifier no. 3
PARAMETRIC AMPLIFIER NO. 3 POWER ON DS1 lamp	DS1	7	Illuminates when circuit breaker CB1 is in OFF position

## Parametric Amplifier Control Panel No. 1 (not shown)

## Circuit Breakers and Indicator Lamps

PARAMETRIC AMPLIFIER NO. 2 POWER ON circuit breaker	CB2	8	Controls application of 120-volt, ac power to parametric amplifier no. 2
PARAMETRIC AMPLIFIER NO. 2 POWER ON DS2 lamp	DS2	9	Illuminates when circuit breaker CB2 is in OFF position
PARAMETRIC AMPLIFIER NO. 1 POWER ON circuit breaker	CB1	10	Controls application of 120-volt, ac power to parametric amplifier no. 1
PARAMETRIC AMPLIFIER NO. 1 POWER ON DS1 lamp	DS1	11	Illuminates when circuit breaker CB1 is in OFF position

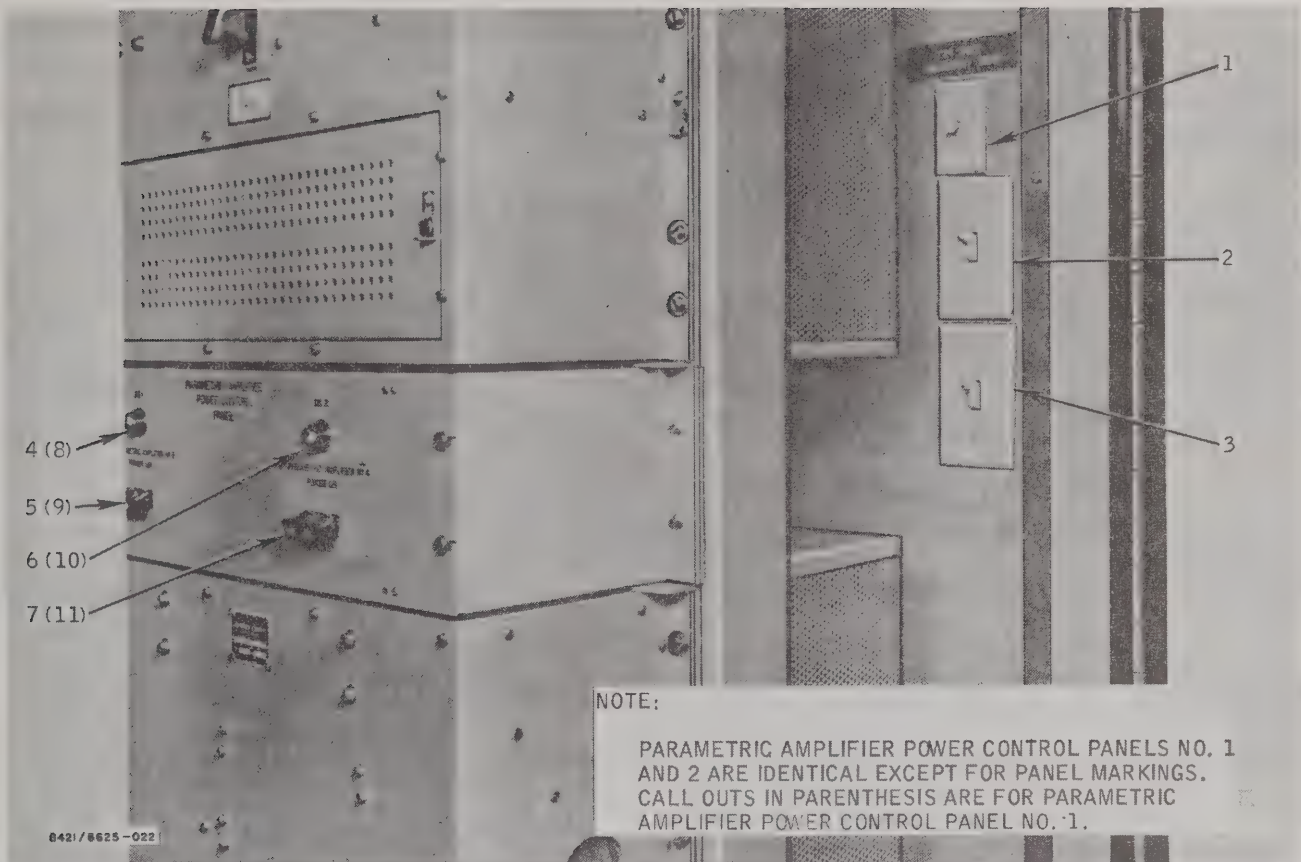


Figure 3-3. Van Curbside Wall, Power Control System, Controls and Indicators (Configuration C only)

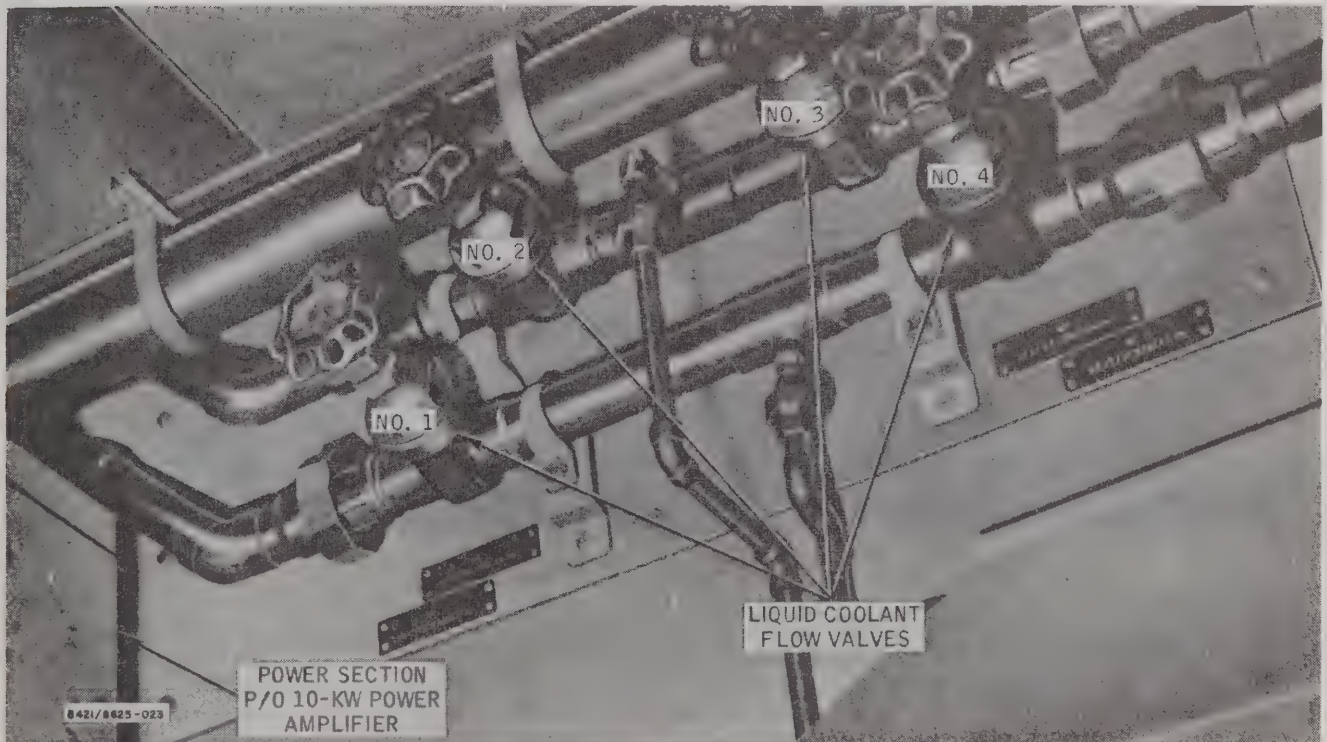


Figure 3-4. Location of 10-KW Heat Exchanger Valves (Roadside Wall)



Table 3-4. Heat Exchanger Valves, Controls (fig. 3-4)

Name	Index Number	Reference Designation	Function
Heat Exchanger Valve	1		Controls flow of coolant from No. 1 heat exchanger (in)
Heat Exchanger Valve	2		Controls flow of coolant to No. 1 heat exchanger (out)
Heat Exchanger Valve	3		Controls flow of coolant to No. 2 heat exchanger (out)
Heat Exchanger Valve	4		Controls flow of coolant from No. 2 heat exchanger (in)

Table 3-5. Power Monitor Panel, Controls and Indicators (fig. 3-5)

Name	Index Number	Reference Designation	Function
FREQUENCY meter	1	M1	Indicates frequency of phase A, phase B, or phase C of 120/208-volt, 60-cps, 3-phase ac power applied to van
Phase-selector switch	2	S1	Four position rotary switch with OFF position; in phase A, phase B, or phase C position connects meters M1 and M2 to phase C, respectively, of 120/208-volt, 60-cps, 3-phase ac power applied to van
VOLTAGE meter	3	M2	Indicates voltage of phase A, phase B, or phase C of 120/208-volt, 60-cps, 3-phase ac power applied to van

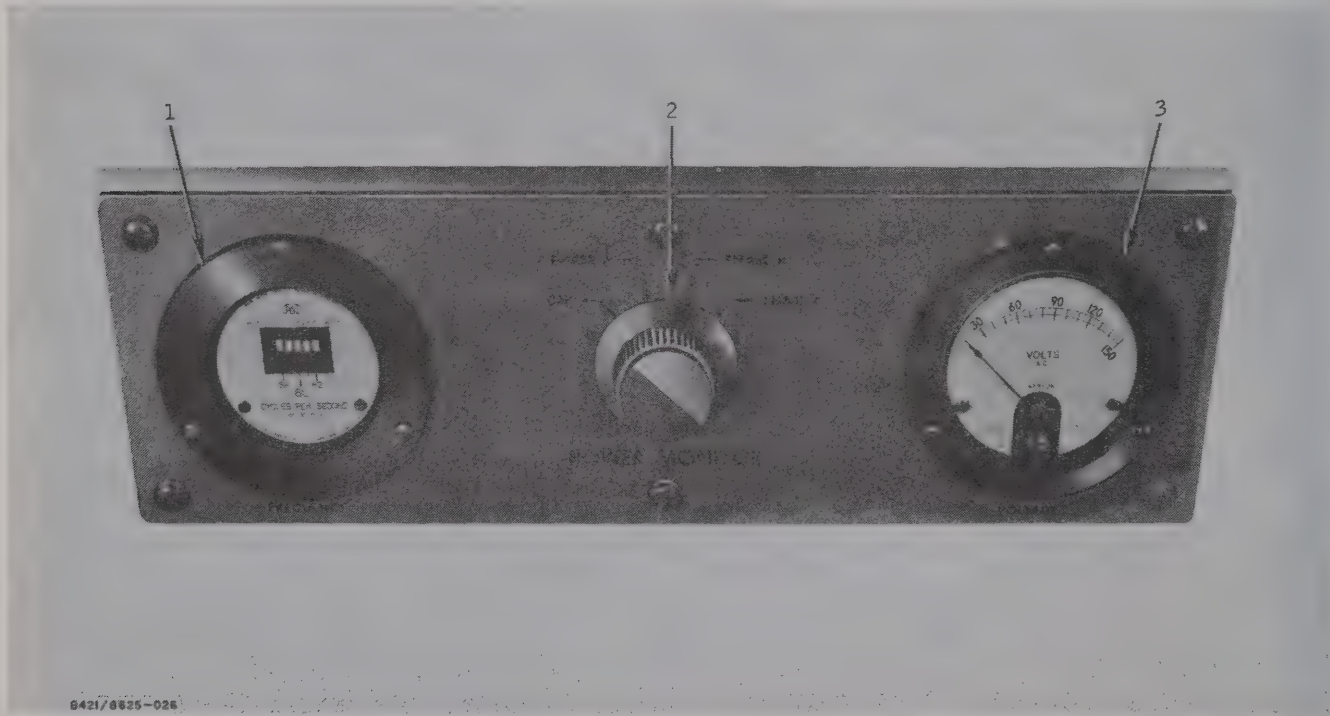


Figure 3-5. Power Monitor Panel  
(Located above the Power Distribution Box on the Roadside Wall)



## SECTION II

### OPERATING INSTRUCTIONS

#### 3-6. GENERAL.

**WARNING**

Circuits in the equipment use high voltages that are dangerous to life; therefore, operating personnel must exercise extreme care and observe all precautions when operating this equipment.

3-7. All procedures in this section are applicable to configurations A, B, and C, unless otherwise indicated.

#### 3-8. PRELIMINARY CHECKS AND CONTROL SETTINGS.

3-9. Before applying primary ac power to the equipment in the power amplifier van, check that the main circuit breaker (fig. 3-1) and circuit breakers CB427 and CB428 are in the OFF positions.

3-10. Check that the following circuit breakers in the distribution box are in OFF positions:

##### a. Configuration A.

- (1) VAN LIGHTS, CB403 (8, fig. 3-2)
- (2) VAN LIGHTS, CB405 (7)
- (3) POWER SECTION NO. 1 (unreg), CB407 (6)
- (4) POWER SECTION NO. 2 (unreg), CB409 (5)
- (5) DUMMY LOAD, CB411 (4)
- (6) CONVENIENCE OUTLETS (exterior), CB412 (15)
- (7) CONVENIENCE OUTLETS (interior), CB 414 (16)
- (8) DEHYDRATOR, CB415 (3)
- (9) HEAT EXCHANGER NO. 1, CB419 (2)
- (10) HEAT EXCHANGER NO. 2, CB420 (19)

#### NOTE

In the following procedure steps, the asterisk (\*) indicates that the particular step is applicable to configuration C only.

##### b. Configurations B and C.

- (1) VAN LIGHTS, CB403 (13, fig. 3-2)
- (2) VAN LIGHTS, CB405 (14)
- (3) POWER SECTION NO. 1 (unreg), CB407 (15)
- (4) POWER SECTION NO. 2 (unreg), CB409 (19)
- (5) DUMMY LOAD, CB411 (1)
- (6) CONVENIENCE OUTLETS (exterior), CB412 (2)
- (7) CONVENIENCE OUTLETS (interior), CB414 (3)
- (8) DEHYDRATOR, CB415 (4)
- (9) HEAT EXCHANGER NO. 1, CB419 (5)
- (10) HEAT EXCHANGER NO. 2, CB420 (6)
- (11) ANTENNA NO. 1 DEICER, CB425 (7)
- (12) ANTENNA NO. 2 DEICER, CB426 (8)
- (13) \*PAR. AMPL. CONTROL PANEL NO. 1, CB408 (16)
- (14) \*PAR. AMPL. CONTROL PANEL NO. 2, CB410 (20)

#### 3-11. TURN ON PROCEDURE.

3-12. To apply primary ac power to equipment in the power amplifier van, proceed as follows:

a. Set the main circuit breaker (fig. 3-1) to the ON position. This applies primary power to the distribution box (fig. 3-2), power monitor panel (fig. 3-5) and to circuit breaker CB427 (fig. 3-1).

b. Throw the two van light switches (fig. 3-3) to the ON position in order to illuminate the two rows of overhead lights.

c. Rotate the phase selector on the power monitor panel (fig. 3-5), progressively, to

phase A, phase B, or phase C. The FREQUENCY meter should indicate a frequency of 60 cps and the VOLTAGE meter should indicate 120 volts in each of the positions.

3-13. To apply primary ac power to components in the van refer to figure 3-2 and throw to the ON positions (in the order listed) circuit breakers listed in paragraphs 3-10a and b.

3-14. Turn on the following equipments as specified in applicable equipment manuals.

NOTE

Be sure that you open the four liquid flow valves (fig. 3-4) associated with the two heat exchanges.

- a. Dehydrator
- b. Heat exchangers
- c. Dummy load
- d. Parametric amplifiers

3-15. Throw circuit breakers CB427 and CB428 (fig. 3-1) to the ON positions. These circuit breakers control primary ac power to power amplifiers no. 1 and 2, respectively.

3-16. Turn on the two 10-kw power amplifiers in accordance to prescribed equipment manuals.

3-17. OPERATION.

3-18. Normally, the power amplifier van is considered to be an unattended facility. External monitoring of the van is accomplished by the use of fault indicator lights and audio alarm circuits in the operations van.

3-19. TURN OFF PROCEDURE

3-20. To turn off equipment and to remove primary ac power in the power amplifier van reverse the procedures as set forth in paragraphs 3-11 through 3-16.

**WARNING**

Prior to your departure from the power amplifier van under turned off conditions, be certain that circuit breakers CB427 and CB428 as well as the main circuit breaker are in OFF positions.

## SECTION III

### EMERGENCY OPERATION

#### 3-21. FAULT INDICATOR AND ALARM SYSTEM.

3-22. As part of an AN/MRC-85 type radio set, operation of the power amplifier van is monitored by an automatic fault indicator and alarm system which gives an alarm indication when one of the major equipments within the power amplifier van has malfunctioned. In the event that a major equipment should fail, there is no specific emergency action that can be taken to restore full normal operation. However, maintenance personnel should be notified immediately in order that the failure can be corrected with a minimum amount of outage time.

#### 3-23. OPERATION AT REDUCED CAPABILITY.

3-24. Operation at reduced capability is available upon failure of any or all of the following equipments:

(1) One to three parametric amplifiers (REL Type 959 or 1055)

(2) One to three converters (REL Type 1054)

(3) One 10-kw power amplifier (REL Type 954 or 954B)

3-25. For example as many as three parametric amplifiers and/or converters may be inoperative and signal intelligence may still be received over the system. However, when only one receiving system is employed, short term fading, characterized by rapid variations in the signal to noise ratio, may be in evidence. Thus, for all practical purposes, a minimum of two parametric amplifiers and converters as used in a dual diversity system (space or polarization) should be employed.

3-26. Should one 10-kw power amplifier become inoperative, the output power will be considerably reduced as compared to the output power obtained from two 10-kw power amplifiers.





## CHAPTER 4

### PRINCIPLES OF OPERATION

**4-1. INTRODUCTION.** Information contained in this chapter will help you to understand the electronic and mechanical principles involved in the operation of the power amplifier van. Section I describes the functional operation of the major components in the van on a system level. Section II

describes the detailed electronic operation of the power distribution system, fault and alarm circuits, and the signal line extension box. Section III describes the functional operation of mechanical assemblies. When reading this section, refer to the applicable illustrations in TM 11-5820-762-25P.

## SECTION I

### FUNCTIONAL SYSTEM OPERATION

#### 4-2. GENERAL.

**4-3.** The power amplifier van, in association with the diesel generator van, operations van, and the two associated antennas comprise the AN/MRC-85 type radio set used as a trans-portable tropospheric scatter terminal to provide transmission and reception of radio signals within the 755- to 985-mc band.

**4-4.** Tropospheric scatter transmission and reception are accomplished by directing the radio signals toward the troposphere, which is approximately six to eight miles above the surface of the earth. Due to small variations in the air density of the troposphere, the transmitted energy is scattered, predominately in the forward direction.

**4-5.** To achieve an extremely reliable communications system, diversity transmission and reception are utilized. This mode of communications, usually, eliminates short term fading which is characterized by rapid variations in the signal-to-noise ratio of the received radio signal.

**4-6.** Diversity transmission is accomplished by using one vertically polarized and horizontally polarized antenna to simultaneously

transmit a vertically and horizontally polarized signal. In addition, space diversity is accomplished by separating the antennas by at least 100 wavelengths.

**4-7.** Four low noise-to-signal ratio type radio receivers, working in conjunction with the two space diversity antenna systems (each system using both vertical and horizontal polarization) are used to receive the tropospheric scatter radio signals. Each of the four radio receiver output circuits is continuously monitored so that only the received signal with the greatest signal-to-noise ratio is utilized.

#### **4-8. FUNCTIONAL SYSTEM OPERATION.**

**4-9.** The following discussion, in conjunction with figure 4-1, will give you an understanding of the functional operation of the major components in the power amplifier van.

#### **4-10. 10-KW POWER AMPLIFIERS.**

**4-11.** The two 10-kw power amplifiers receive an rf input of approximately 20 watts from each exciter-amplifier in the operations van, and boost this power up to the 10-kw level. This output power, in turn, is applied through a pair of diplexers to the waveguides

and to the antenna systems for transmission. A four-cavity klystron provides the necessary power amplification for each amplifier. The power amplifiers also contain circuits which detect abnormal conditions, such as overheating, excessive current drain, and automatic stop operation. Fault indicator and alarm facilities in the operation van monitor these circuits. Each 10-kw power amplifier is air and liquid cooled; the liquid coolant is supplied by the two heat exchangers.

#### 4-12. HEAT EXCHANGERS.

4-13. The heat exchangers are located in an area which is well ventilated (both ends of the van) so that the coolant can transfer its heat to the outside air. The coolant, which is composed of ethylene glycol (52-1/2 percent) and deionized water, is pumped through hydraulic lines into the jacket surrounding the klystron tube by the heat exchanger. The coolant is circulated through the walls of the klystron to absorb heat, and then back to the heat exchanger for recooling.

#### 4-14. CALORIMETER (DUMMY LOAD).

4-15. The 10-kw dummy load simulates the correct load across the output of one 10-kw power amplifier when out-of-service tests or adjustments are required. Either power amplifier may be connected to the dummy load.

#### 4-16. DEHYDRATOR.

4-17. The purpose of the dehydrator is to provide a continuous source of low pressure dry air to the two waveguides and antennas. This dry air prevents condensation within the waveguides and antennas. Audio and visual alarms for the dehydrator are located in the operations van. For example, when the dry air pressure drops below 1.4 inches of water or when the relative humidity of the air rises above 4 percent at +70°F (+21.1°C), the alarms are actuated.

#### 4-18. DIPLEXERS.

4-19. Two diplexers each permit simultaneous operation of a transmitter and receiver through a common antenna terminal. Each diplexer consists of a three-terminal network constructed of waveguide and filter equipment containing a transmit filter and a receive filter. The two filters are connected by an H-plane compensating tee network that connects the

waveguide run to the transmit-receive feedhorn of its associated antenna. The other end of each filter has separate coaxial connections to its associated 10-kw power and parametric amplifiers. The transmit and receive filters are tuned to separate frequency bands in the frequency range of 755 to 985 mc. When each filter is properly tuned, the receive filter appears as a short circuit to the transmit frequency, and the transmit filter as a short circuit to the receive frequency.

#### 4-20. RECEIVE FILTERS.

4-21. Each receive filter is tuned to a frequency within the band of 755 to 985 mc. This rf energy from an associated antenna is coupled to a parametric amplifier via the receive filter. Any signals outside the filter bandpass are attenuated to reduce the noise level of the desired signal. Each receive filter consists of a two-terminal network constructed with a straight section of waveguide and filter elements. One end of the waveguide is connected to the receiver feedhorn of its associated antenna. The other end is terminated into a transition to allow coaxial cable coupling to its associated parametric amplifier.

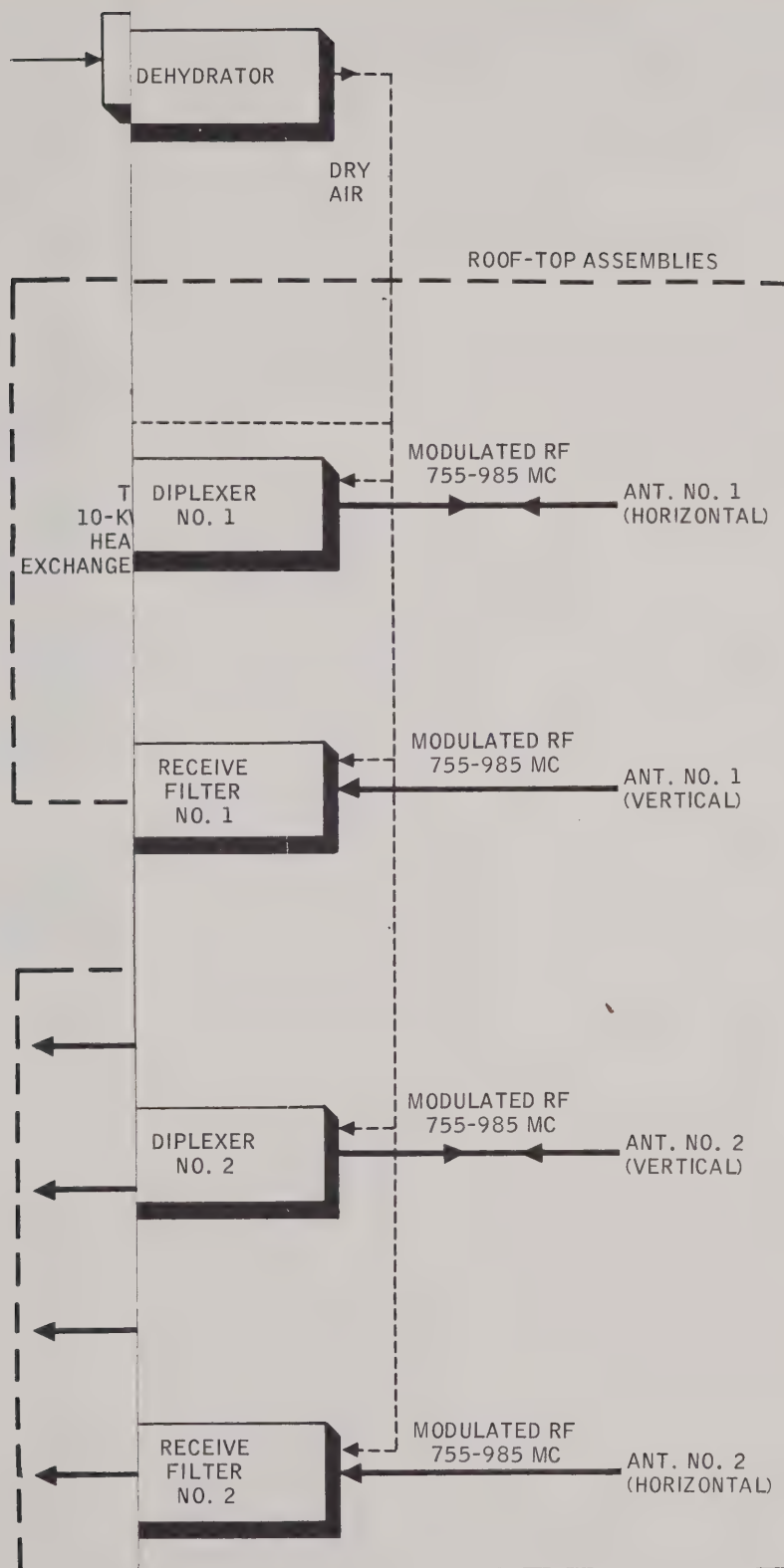
#### 4-22. PARAMETRIC AMPLIFIERS.

4-23. Each of the four parametric amplifiers receives a multiplexed rf signal in the frequency range of 755 to 985 mc from associated antennas via twodiplexers and two receive filters. Four special cable assemblies connect preselectors to the parametric amplifiers. Each parametric amplifier provides low-noise rf amplification of its input signal and then combines it with the output signal of a local oscillator to produce a 70-mc signal. This signal is fed to the input circuit of its respective receiver.

#### 4-24. PARAMETRIC AMPLIFIER CONTROL PANELS (CONFIGURATION C ONLY).

4-25. Two parametric amplifier control panels (fig. 3-3 and 6-3) control the application of 120 vac (regulated and unregulated) and 6.3 vac for the four parametric amplifiers. These voltages are applied to thermostat ovens and other circuits associated with the parametric amplifiers. These voltages are applied to thermostat ovens and other circuits associated with the parametric amplifiers. Control panels no. 1 and no. 2 are associated





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fier Van, Functional Block Diagram

and to the antenna systems for transmission. A four-cavity klystron provides the necessary power amplification for each amplifier. The power amplifiers also contain circuits which detect abnormal conditions, such as overheating, excessive current drain, and automatic stop operation. Fault indicator and alarm facilities in the operation van monitor these circuits. Each 10-kw power amplifier is air and liquid cooled; the liquid coolant is supplied by the two heat exchangers.

#### 4-12. HEAT EXCHANGERS.

4-13. The heat exchangers are located in an area which is well ventilated (both ends of the van) so that the coolant can transfer its heat to the outside air. The coolant, which is composed of ethylene glycol (52-1/2 percent) and deionized water, is pumped through hydraulic lines into the jacket surrounding the klystron tube by the heat exchanger. The coolant is circulated through the walls of the klystron to absorb heat, and then back to the heat exchanger for recooling.

#### 4-14. CALORIMETER (DUMMY LOAD).

4-15. The 10-kw dummy load simulates the correct load across the output of one 10-kw power amplifier when out-of-service tests or adjustments are required. Either power amplifier may be connected to the dummy load.

#### 4-16. DEHYDRATOR.

4-17. The purpose of the dehydrator is to provide a continuous source of low pressure dry air to the two waveguides and antennas. This dry air prevents condensation within the waveguides and antennas. Audio and visual alarms for the dehydrator are located in the operations van. For example, when the dry air pressure drops below 1.4 inches of water or when the relative humidity of the air rises above 4 percent at +70°F (+21.1°C), the alarms are actuated.

#### 4-18. DIPLEXERS.

4-19. Two diplexers each permit simultaneous operation of a transmitter and receiver through a common antenna terminal. Each diplexer consists of a three-terminal network constructed of waveguide and filter equipment containing a transmit filter and a receive filter. The two filters are connected by an H-plane compensating tee network that connects the

waveguide run to the transmit-receive feedhorn of its associated antenna. The other end of each filter has separate coaxial connections to its associated 10-kw power and parametric amplifiers. The transmit and receive filters are tuned to separate frequency bands in the frequency range of 755 to 985 mc. When each filter is properly tuned, the receive filter appears as a short circuit to the transmit frequency, and the transmit filter as a short circuit to the receive frequency.

#### 4-20. RECEIVE FILTERS.

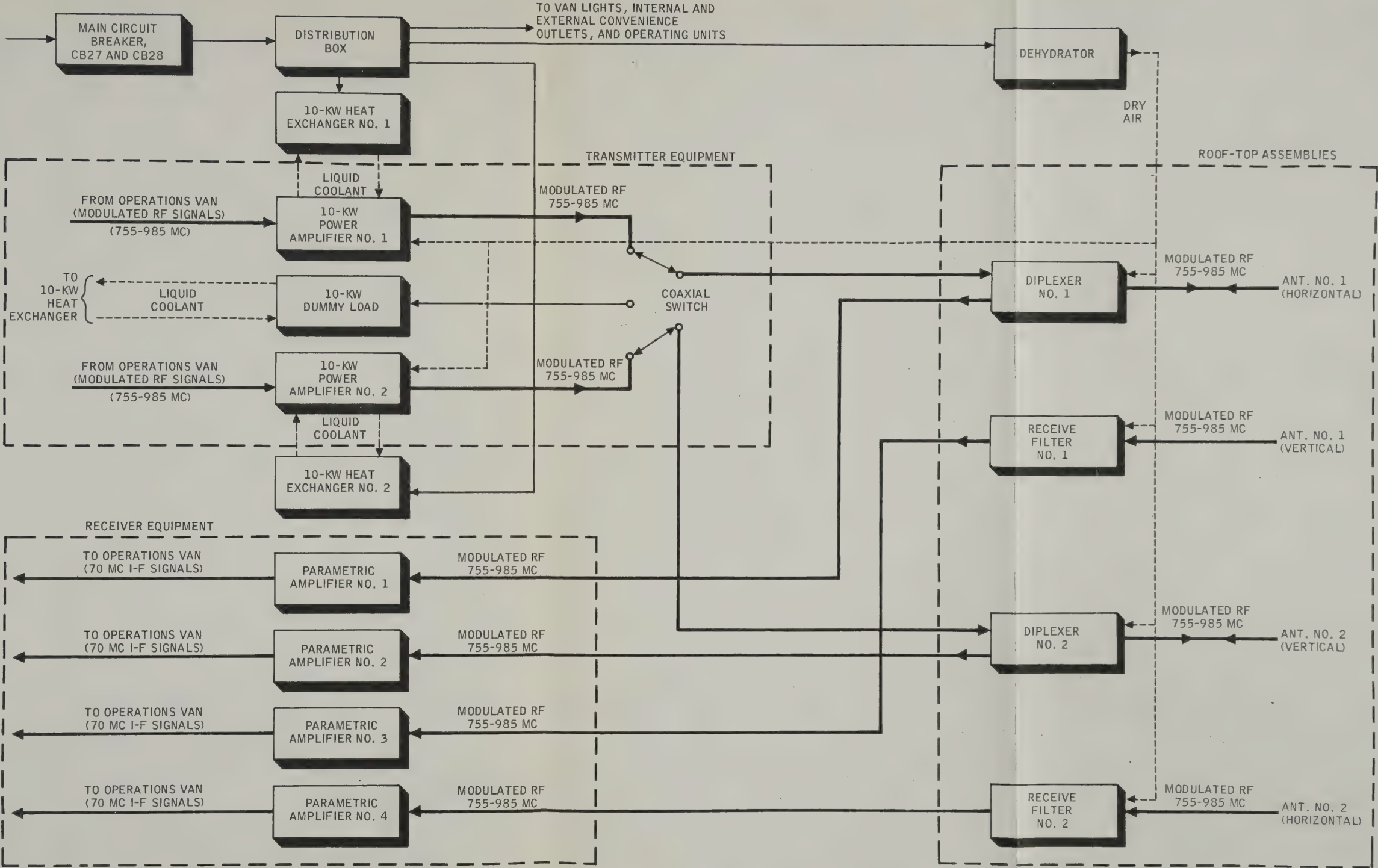
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Figure 4-1. Power Amplifier Van, Functional Block Diagram





with parametric amplifiers nos. 1 and 2 and nos. 3 and 4, respectively.

4-26. Since the two parametric amplifier control panels are identical, with exception of panel markings, only control panel no. 1 is discussed. Figure 3-3 illustrates a typical parametric amplifier with its associated control panel.

4-27. The incoming 120 volts, regulated, ac power, from 10-kw power amplifier no. 1 is applied through parallel-connected terminals no. 1 and no. 2 of terminal boards 405TB1 and 405TB2 to circuit breakers CB1 and CB2, respectively. These circuit breakers are installed on parametric amplifier control panel no. 1. With CB1 in the ON position, the 120 volts (regulated) ac power is applied to parametric amplifier no. 1 through terminals nos. 4 and 5 (B+Pri) and terminals nos. 4 and 6 (fil) of terminal board 405TB1. With circuit breaker CB2 in the ON position, the 120 volts (regulated) ac power is applied to parametric amplifier no. 2 through terminals nos. 4 and 5 (B+Pri) and nos. 4 and 6 (fil) of terminal board 405TB1.

#### 4-28. LIGHT SWITCHES.

4-29. Switches listed in table 3-3 control 12 ceiling van lights, 2 interior rear spotlights, and 2 interior front spotlights. These spotlights are located adjacent to the two 10-kw power amplifiers.

#### 4-30. SIGNAL LINE EXTENSION BOX.

4-31. A signal line extension box is located on the exterior, roadside, of the power amplifier van. This box electrically interconnects (by cables) the power amplifier van to its supporting facilities. Each box contains four multiconnectors, seven coaxial connectors, and a duplex weatherproof convenience outlet.

#### 4-32. PRIMARY CIRCUIT BREAKERS.

4-33. The primary circuit breakers control the ac power to all ac components in the power amplifier van. These circuit breakers consist of the main circuit breaker and circuit breakers CB427 and CB428. The main circuit breaker furnishes primary power to the power monitor panel, distribution box, and to circuit breaker CB427. Circuit breakers CB427 and CB428 apply primary ac power to power amplifiers no. 1 and 2, respectively.

#### 4-34. FAULT AND ALARM INDICATORS.

4-35. Fault and alarm indicators in the operations van indicate failures in the power amplifier as well as in the diesel generator vans. These indicators are an integral part of the AN/MRC-85 type radio set and are discussed in TM 11-5820-763-15 for the operations van.





## SECTION II

### FUNCTIONAL OPERATION OF ELECTRONIC CIRCUITS

#### 4-36. GENERAL.

4-37. The following discussion, in conjunction with the appropriate schematic diagram in Chapter 6, will give you an understanding of the functional operation of electronic circuits in the power amplifier van.

#### 4-38. PRIMARY POWER DISTRIBUTION.

4-39. Required primary power of 120/208 volts, 60 cycles, 3 phase for the power amplifier van is obtained externally from the diesel generator van or other associated equipment. This power is provided to connectors J415 and J416 in the power entrance box of the power amplifier van. Connector J415 applies power to the main circuit breaker (225 amperes), to circuit breaker CB427 (125 amperes) which controls power to power amplifier no. 1, to the power monitor panel, and to the distribution box. Connector J416 applies power to circuit breaker CB428 (125 amperes) which controls power to power amplifier no. 2.

#### 4-40. DISTRIBUTION BOX.

4-41. The distribution box, through its internal circuit breakers, furnishes power to the remaining electrical components, including the van lighting. Each circuit breaker is labeled to denote its capacity and function.

#### 4-42. POWER MONITOR PANEL.

4-43. The power monitor panel contains a FREQUENCY meter, M1, a VOLTAGE meter, M2, and a phase selector, S1. The FREQUENCY meter operates in the range of 58 to 62 cps and is used to monitor the 60-cps

frequency of each phase-to-neutral ac voltage applied to the van. The VOLTAGE meter operates in the range of 0 to 150 volts with an accuracy of  $\pm 2$  percent of full scale and is used to measure the 120-volt phase-to-neutral ac voltage of each of the three phase voltages applied to the van. Phase selector S1, a four-position rotary switch, is used to connect meters M1 and M2 to phase A, B, or C of the three phase voltages, or to the OFF position which disconnects both meters from the three phase ac power circuits.

#### 4-44. POWER ENTRANCE BOX.

4-45. The power entrance box (fig. 2-14) is located on the exterior, roadside, of the power amplifier van. This box acts as a terminal for electrically interconnecting the power cables between power amplifier van and that of the diesel generator van. Two jacks (J415 and J416) with multiconnectors and two ground posts are located in this box.

#### 4-46. SIGNAL LINE EXTENSION BOX.

4-47. The signal line extension box is located on the rear exterior of the power amplifier van. The signal line extension box electrically interconnects (by cables) the operations and power amplifier vans. Each box contains four multiconnectors, seven coaxial connectors, and a duplex weatherproof convenience outlet.

#### 4-48. EQUIPMENT THEORY.

4-49. Theory of individual major components in the power amplifier van are detailed in applicable equipment manuals listed in Appendix A to this manual.



## SECTION III

### FUNCTIONAL OPERATION OF MECHANICAL ASSEMBLIES

#### 4-50. GENERAL.

4-51. This section provides information describing the functional operation of the van's suspension system, landing gear, leveling jacks, and brake system.

#### 4-52. SUSPENSION SYSTEM.

4-53. The suspension system is designed so that the entire assembly (axle, springs, wheels, and attached brake system components) may readily be removed for air transportation of the van. To remove the suspension system, it is only necessary to remove the 32 attaching bolts and disconnect the brake system air lines to the brake air chambers.

#### 4-54. SPRING AND AXLE.

4-55. Each of the two springs consists of 11 leaves held together by a center bolt and four spring clips. The two larger spring clips attach at the outer ends of the third spring leaf from the bottom, and the two smaller spring clips attach at the outer ends of the sixth spring leaf from the bottom. The spring is secured to the axle by two U-bolts and attaching nuts. The two ends of each spring are supported by spring bolts. A radius rod, to provide axle alignment, extends from the top of each spring assembly to the forward spring block.

4-56. The axle has a 71-inch track and consists of a hollow steel tube, five inches in diameter, with solid spindles inserted at each end. These spindles support the hub and brakedrum assembly rotating on the wheel bearings.

#### 4-57. WHEELS AND TIRES.

4-58. Two offset disc-type wheels are bolted to each hub with 10 studs and double cap nuts.

The wheels have removable split rings to secure the tires to the rims.

4-59. The tires are a 10.00 X 20, 12-ply type, and are inflated to 70 psi for highway driving, 50 psi for cross-country driving, and 25 psi for sand driving.

#### 4-60. HUBS AND BRAKEDRUMS.

4-61. Each hub rotates on and is held in place by two opposed, tapered sets of roller bearings located on the spindle. Cups for the two sets of roller bearings are press fitted into the hub. The hub assembly is secured on the spindle by two spindle nuts and a lockwasher.

4-62. The brakedrum is secured to each hub by the 10 wheel studs and wheel stud nuts attached on the inside of the brakedrum. A dust shield is mounted on the brake spider to prevent entry of foreign matter into the brake-drum assembly.

#### 4-63. LANDING GEARS AND LEVELING JACKS.

#### 4-64. LANDING GEAR.

4-65. The landing gears are each attached to the van near the forward end of the chassis so as to properly support the van when it is not connected to the prime mover. Each landing gear consists of a ratchet crank, gear box, upper leg, lower leg, and a pad. Each landing gear is individually operated by inserting the ratchet crank into the gear box and rotating it. The gear box provides two speeds of operation—fast and slow—for the raising and lowering of the van. The fast speed is provided for rapid movement of the legs when there is no load on them, whereas the low speed provides greater power for raising and lowering the front end of the van when the pads are in contact with the ground.



## 4-66. LEVELING JACK.

4-67. A leveling jack is attached to each rear corner of the van to level it in its operating position. The jack is operated by inserting the operating handle (stored in the van tool box) into the hole in the bottom of the screw and turning the screw.

## 4-68. BRAKE SYSTEM.

4-69. The brake system (fig. 4-2) on the power amplifier van is a full air brake system operated completely by air pressure from the prime mover (tractor). Operation is as follows: With the air hose couplings connected to the tractor shutoff cocks open, air fills the van brake system to a pressure equivalent to the pressure at the tractor. When the van brakes are applied, air pressure is directed through the service air line to the emergency relay valve. This valve releases compressed air from the air reservoir to the two brake air chambers. As air enters the brake air chambers, the motion of its diaphragm is trans-

ferred through the slack adjuster to one end of the camshaft. The other end of the camshaft enters the brake mechanism where the movement of the cam attached to the shaft forces the brakeshoes and lining against the brakedrum. When the van brakes are released, a drop in pressure causes the emergency relay valve to release the compressed air from the brake air chamber allowing the retract spring in the brake mechanism to pull the brakeshoes and lining away from the brakedrum.

4-70. Two air lines, the service line, and the emergency line, are connected to the tractor. Brake application and release are accomplished by varying the air pressure in the service line, while filling of the air reservoir and automatic break-away protection are provided by the emergency air line.

## 4-71. HOSE COUPLINGS AND SHUT OFF COCKS.

4-72. Two hose couplings are mounted on the front ends of the SERVICE and EMERGENCY

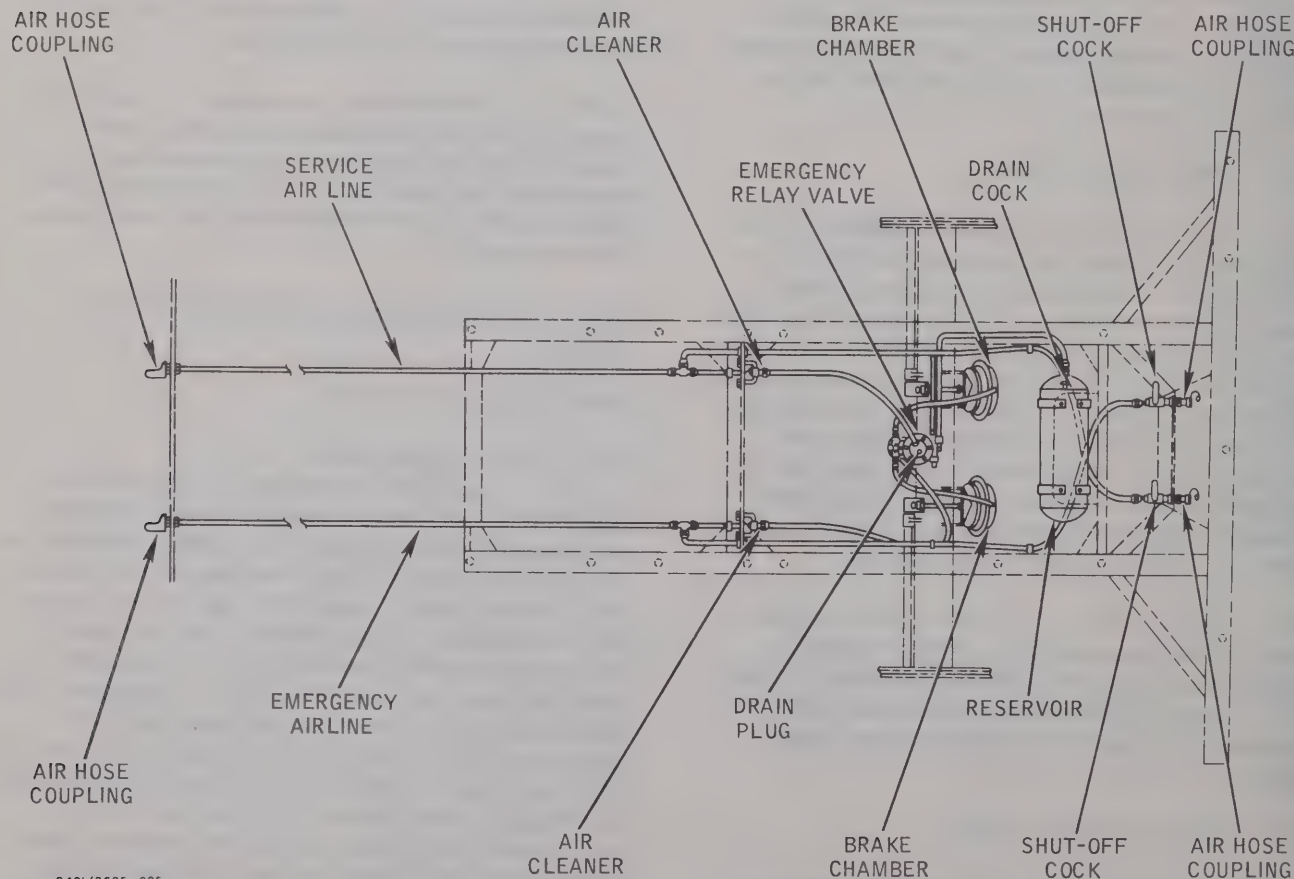


Figure 4-2. Brake System

air lines of the power amplifier van. Another set of these couplings, including shut off cocks (fig. 4-2), is located adjacent to the rear wheels to furnish air line connections for towing another van. When the hose couplings are not connected, they are fitted to dummy couplings on the chassis to prevent debris from entering the air line system.

#### 4-73. AIR CLEANER.

4-74. An air cleaner is connected into both the SERVICE and EMERGENCY air lines to remove moisture or foreign matter from the air. Each cleaner is provided with a drain plug and a replaceable filter element.

#### 4-75. EMERGENCY RELAY VALVE.

4-76. The emergency relay valve speeds brake action by releasing air from the air reservoir directly to the brake air chamber when required. This eliminates loss of time that would result if sufficient air volume for brake application had to travel from the tractor to the brake air chamber. The emergency relay valve also controls air flow to and from the air reservoir so that if there is a sudden loss of pressure in the emergency air line (such as van breaking away from tractor), the brakes are automatically applied. The emergency relay valve releases air to the brake air chambers in direct proportion to the pressure applied to the van brakes from the tractor. A drain plug on the bottom of the valve serves to drain accumulated moisture.

#### 4-77. AIR RESERVOIR.

4-78. The air reservoir is connected to the emergency relay valve by one air line; it provides a quickly available supply of air under sufficient pressure to operate the brakes, either when applied from the tractor or when applied by the emergency action of the emergency relay valve. The air reservoir is provided with a drain cock to release brake system air pressure and/or drain any accumulated moisture.

#### 4-79. AIR CHAMBERS AND INTERNAL BRAKE MECHANISM.

4-80. The brake air chambers convert air pressure from the emergency relay valve to mechanical motion to operate the brake mechanism. Air pressure enters one side of the air chamber and moves a diaphragm attached to a push rod. One end of the push rod protrudes from the air chamber and attaches to the slack adjuster and camshaft.

4-81. The camshaft enters the internal brake mechanism through a hole in the dust shield. The cam attached to this end of the camshaft is located between the two unattached brake-shoe ends. When the cam moves, it forces the brakeshoes outward against the brakedrum, thus slowing wheel rotation. When cam pressure forcing the brakeshoes outward is released, the brake retract spring returns the brakeshoes to their original position.





## CHAPTER 5

### MAINTENANCE

5-1. INTRODUCTION. This chapter contains the instructions you will need to maintain the power amplifier van. Section I of this chapter establishes standardized work methods and simplified step-by-step instructions for preventive maintenance of the equipment. Section II of this chapter gives instructions for organiza-

tional/field maintenance procedures which supplement those contained in Section I. Also included in Section II are complete test and replacement procedures for the equipment. Section III, Special Maintenance, contains data for maintenance not normally accomplished at the organizational/field level.

## SECTION I

### PREVENTIVE MAINTENANCE

#### 5-1.1 GENERAL

5-1.2. This section contains the routines required for preventive maintenance of the power amplifier van. These routines are supplemented with the instructions in Section II. Table 5-A lists the preventive maintenance routines, along with a recommended schedule for accomplishment. The intervals are based on continuous operation of the equipment.

#### 5-1.3. POWER MONITOR PANEL METER CHECKS.

5-1.4. The purpose of this routine is to check the frequency and voltage of the incoming ac power. Proceed as follows:

a. Locate the POWER MONITOR panel which is on the roadside wall above the POWER DISTRIBUTION PANEL.

#### NOTE

The main circuit breaker (the lower of the two circuit breakers adjacent to the Power Amplifier)

must be in the ON position before reading the POWER MONITOR panel meters.

b. Rotate the selector on the POWER MONITOR panel through positions PHASE A, PHASE B, and PHASE C while observing the FREQUENCY meter for an indication of 60 cycles per second and the VOLTAGE meter for an indication of 120 volts ac at each phase.

c. Turn the selector to the OFF position.

#### 5-1.5. POWER AMPLIFIER VAN TURN-ON AND TURN-OFF PROCEDURES.

5-1.6. The purpose of this routine is to turn on and turn off ac power to the equipment in the power amplifier van. Proceed as follows:

a. Perform the following preliminary checks and control settings:

Table 5-A. Preventive Maintenance Routines

Routine	Interval	Para-graph
Power Monitor Panel Meter Checks	Daily	5-1.3
Power Amplifier Van Turn-On and Turn-Off Procedures	As required	5-1.5
Power Amplifier Van Leveling	As required	5-1.7
Power Amplifier Van Axle Alignment	As required	5-1.9
Inspection and Cleaning of Power Amplifier Van Interior	Weekly	5-1.11
Waveguide Inspection	Weekly	5-1.15
Airbrake System Moisture Drainage	Weekly	5-1.17
Power Amplifier Van Exterior Inspection and Cleaning	Bi-weekly	5-1.19
Airbrake System Inspection and Cleaning	Bi-weekly	5-1.23
Pioneer Kit Inspection and Cleaning	Monthly	5-1.25
Fire Extinguisher Inspection	Monthly	5-1.29
Tarpaulin Inspection and Cleaning	Monthly	5-1.31
Lubrication	Monthly	5-1.33
Airbrake Air Filters Inspection and Cleaning	Monthly	5-1.37
24-Volt Lighting System Inspection	Monthly	5-1.41
Tire Inspection	Monthly	5-1.43

(1) Check that all circuit breakers on the POWER DISTRIBUTION PANEL (below the POWER MONITOR panel to the right of the roadside door) are in the OFF position.

(2) Check that the three large circuit breakers to the right of the POWER DISTRIBUTION PANEL are in the OFF position.

(3) Check that all power switches on the equipment in the van are in the OFF position.

b. Turn on ac power in the Power Amplifier Van in the following manner:

(1) Set the main circuit breaker (the lower of the two large circuit

breakers adjacent to the Power Amplifier) to the ON position and rotate the selector on the POWER MONITOR panel through positions PHASE A, PHASE B, and PHASE C. Check that the FREQUENCY meter indicates 60 cycles per second and the VOLTAGE meter indicates 120 volts ac at each position.

(2) Set the VAN LIGHTS circuit breakers, located in the POWER DISTRIBUTION PANEL, to the ON position and operate the associated switches on either the curbside or the roadside wall of the van. Check that the ceiling lights and spotlights illuminate.

(3) Set the remaining circuit breakers in the POWER DISTRIBUTION PANEL to the ON position.

(4) Set the two Power Amplifier circuit breakers (one located above and one located to the left of the main circuit breaker) to the ON position. This completes the ac power turn-on procedure.

c. Turn off ac power in the Power Amplifier Van in the following manner:

(1) Set all equipment power switches to the OFF position.

(2) Set all POWER DISTRIBUTION PANEL circuit breakers except the two POWER SECTION UNREG AC circuit breakers to the OFF position.

(3) Set the two Power Amplifier circuit breakers to the OFF position.

(4) Wait 5 minutes, then set the two POWER SECTION UNREG AC circuit breakers located in the POWER DISTRIBUTION PANEL to the OFF position.

(5) Set the main breaker to the OFF position. This completes the ac power turn-off procedure.

#### 5-1.7. POWER AMPLIFIER VAN LEVELING.

5-1.8. The purpose of this routine is to level the power amplifier van. Proceed as follows:

#### NOTE

Two people will be required for the performance of this routine; one person should operate the landing gear or leveling jack and the other should observe the bench levels.

#### WARNING

Before performing this routine check that both landing gear sand pads are resting firmly on the ground. Insure that the cranks are removed from the gear boxes and the wheel chocks are firmly in position.

a. Unhook each landing gear crank (at the front of the van) from its support and insert it to its full limit in the associated gear box.

#### NOTE

When the crank is inserted to the full limit, you may operate the landing gear through slow travel. Fast adjustments to the landing gear are made possible by moving the crank to its outer position.

b. Remove the two bars clamped in the van toolbox and insert one into the hole in the threaded shaft of each leveling jack.

c. While one person observes the bench levels (one located at the front of the van and the other two above each landing gear assembly), the other should rotate the landing gear cranks or operate the leveling jack bars (as directed by the observer of the bench levels) until the van is correctly positioned.

d. After the van is leveled, remove the landing gear cranks and hook them to their supports. Replace the leveling jack bars and clamp them securely in the van toolbox.



### 5-1.9. POWER AMPLIFIER VAN AXLE ALIGNMENT.

5-1.10. The purpose of this routine is to align the axle of the power amplifier van. The materials required are a wheel nut wrench, a steel measuring tape, and an adjustable wrench. Proceed as follows:

- a. Remove both outer wheels as follows:

#### NOTE

The van must be detached from the prime mover before performing this routine.

- (1) Using the wheel nut wrench, loosen the six outer wheel hexagonal nuts on each wheel.

#### NOTE

The nuts on the right side are marked "R" and have right-hand threads; the nuts on the left side are marked "L" and have left-hand threads. The nuts must be turned in the opposite direction from the normal forward rotation of the wheel to be removed.

- (2) Jack up the van, using the leveling jacks, until the tires clear the ground.

- (3) Remove the outer wheel nuts and then remove the outer wheels from the hubs.

b. Measure the distance between the king pin and the center point of each hubcap (figure 5-1). If the distances are within 1/16 inch of one another, proceed with step f, if not, proceed with step c.

- c. Loosen the locking nut at each end of the roadside radius rod (figure 5-2).

- d. Adjust the roadside radius rod as required until the distances (measured in step b) are within 1/16 inch of each other.

- e. Tighten the locking bolts.

- f. Replace the wheel on the hub and finger-tighten the nuts. Make sure that the valve stem of the outer wheel is not aligned with the valve stem of the inner wheel.

- g. Using the wheel nut wrench, alternately tighten the nuts on opposite sides of the wheel to insure even tightness.

- h. Perform steps f and g for the wheel.

- i. Lower the van until the tires touch the ground; recheck all nuts for tightness.

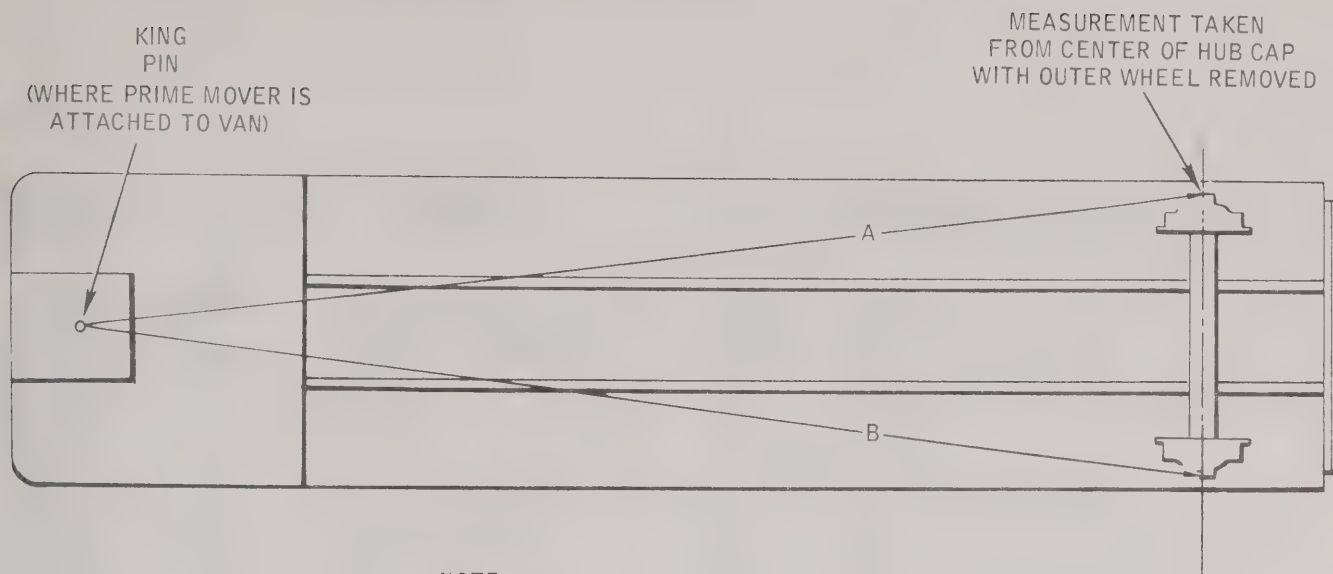
### 5-1.11. INSPECTION AND CLEANING OF POWER AMPLIFIER VAN INTERIOR.

#### 5-1.12. General Information

- a. The purpose of this routine is to clean and inspect the interior of the Power Amplifier Van.

- b. Solvent is only to be used for removing corrosion. Where dry cleaning is required, you must determine whether a cleaning cloth, brush, or vacuum cleaner is required (in some instances it may be necessary to use all three).

- c. In the performance of this routine, you are expected to remove all dirt, and corrosion found during inspection.



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Figure 5-1. Axle alignment.

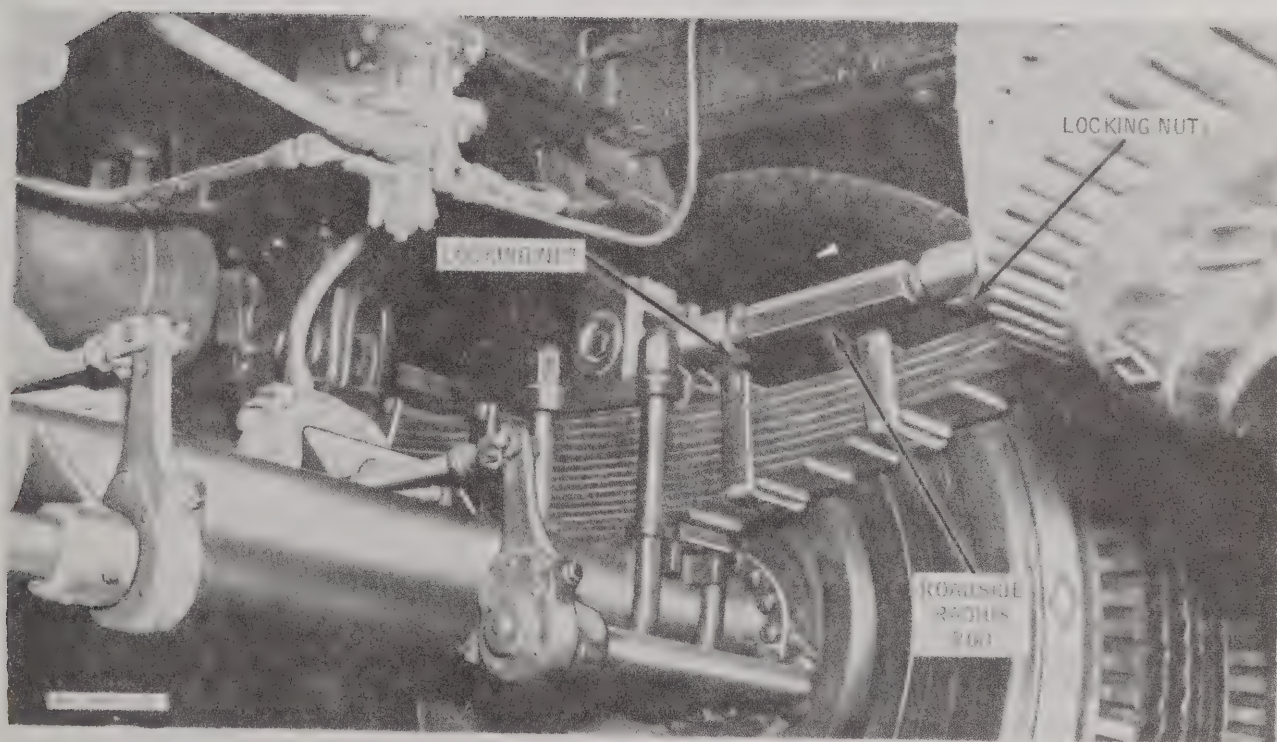


Figure 5-2. Roadside radius rod adjustment.

d. Avoid the displacement of wires, parts, and cables during cleaning and inspection routines.

e. Where cleaning space is limited, carefully use a vacuum cleaner as a blower to dislodge dust and foreign matter.

f. The approximate time required for inspection and cleaning will vary with the complexity of the individual unit.

#### 5-1.13. MATERIALS REQUIRED

a. Cleaning solvent, Federal Specification P-S-661.

#### WARNING

Prolonged contact of skin with cleaning solvent or inhalation of fumes is dangerous. Provide adequate ventilation.

b. Clean, dry cloths

c. Vacuum cleaner

d. Brush

#### 5-1.14. PROCEDURE

#### WARNING

To prevent burns or shock, avoid contact with exposed wires, terminals, and heated parts.

#### INSPECT

#### FOR

Wiring

Frayed, broken, and burned insulation  
Pinched and broken leads  
Disconnected leads

Connectors and receptacles

Insecure mounting  
Bent and missing pins  
Damaged shells

Cables

Damaged insulation  
Improper routing  
Kinking and twisting  
Loose and damaged cable clamps

Terminal boards

Breaks, cracks, or loose terminals  
Insecure mounting

Panel controls

Loose and missing controls  
Improper switching action  
Insecure mounting

Panel meters

Cracked, broken, and missing meter glass  
Damaged and frozen meter needles  
Loose and broken connections  
Illegible index and scale markings

Panels and covers

Loose and missing hardware  
Physical damage  
Illegible markings and nameplates

Fuses and Fuseholders

Missing fuses  
Improper fuse rating  
Damaged fuseholder  
Insecure mounting

Indicator lamps and sockets

Missing and burned-out lamps  
Damaged sockets  
Damaged and missing lenses  
Insecure mounting



<u>INSPECT</u>	<u>FOR</u>	
Circuit breakers and toggle switches	Hot or noisy operation Damaged connections Improper switching action Insecure mounting	a. Inspect all waveguide support hardware for secure mounting.
Rotary switches	Broken and cracked wires Loose and broken contacts Improper switching action Improper mating of contact surfaces Insecure mounting	b. Inspect all waveguide joints for tightness.
Flashlight and lantern	Improper operation Broken lenses Corrosion Insecure mounting	c. Inspect the waveguide for dents, cracks, discoloration, and other deformations.
Storage cases and bags	Incorrect placement Insecure mounting	d. Using the torque wrench, check all coupling nuts and flange bolts for tightness. Tension should be 18 pound-feet.
Pencil sharpener	Improper operation Insecure mounting	e. Note the reading on the pressure gauges above each Power Amplifier. Each should indicate approximately 3.0 inches of water.
Extension lights	Improper operation Insecure mounting	f. After the transmitter has been in operation for at least 30 minutes, check for hot spots by running your hand along the waveguide.
Spare klystron carriage and dolly	Physical damage Insecure mounting	
Air filters	Clogged elements Physical damage	

#### 5-1.15. WAVEGUIDE INSPECTION.

5-1.16. The purpose of this routine is to inspect the waveguide of the power amplifier van. A torque wrench (0-40 pound-feet) is required. Proceed as follows:

#### 5-1.17. AIRBRAKE SYSTEM MOISTURE DRAINAGE

5-1.18. The purpose of this routine is to drain accumulated moisture from the van airbrake system. A 10-inch adjustable wrench is required. Proceed as follows:

#### **WARNING**

Before performing this routine check that both landing gear sand pads are resting firmly on the ground. Insure that cranks are removed from gear boxes and wheel chocks are firmly in position.

a. Remove the drain plug from the bottom of the relay valve, using the adjustable wrench (figure 5-3).

b. Replace the drain plug on the bottom of the relay valve when accumulated moisture has drained.

c. Remove the drain plug from the bottom of each air filter using the adjustable wrench.

d. Replace both drain plugs when accumulated moisture has drained.

e. Open the drain cock on the air reservoir using the adjustable wrench.

f. Close the drain cock on the air reservoir when accumulated moisture has drained.

5-1.19. POWER AMPLIFIER VAN EXTERIOR  
INSPECTION AND CLEANING.

5-1.20. GENERAL INFORMATION

a. The purpose of this routine is to inspect and clean the power amplifier van exterior.

b. The approximate time required for the performance of this routine is 2 man-hours.

5-1.21. MATERIALS REQUIRED

a. Soap and water solution

b. Clean, dry cloths

c. Hose and water source

d. Preservative lubricating oil, Federal Specification VV-L-820B

e. Sponge

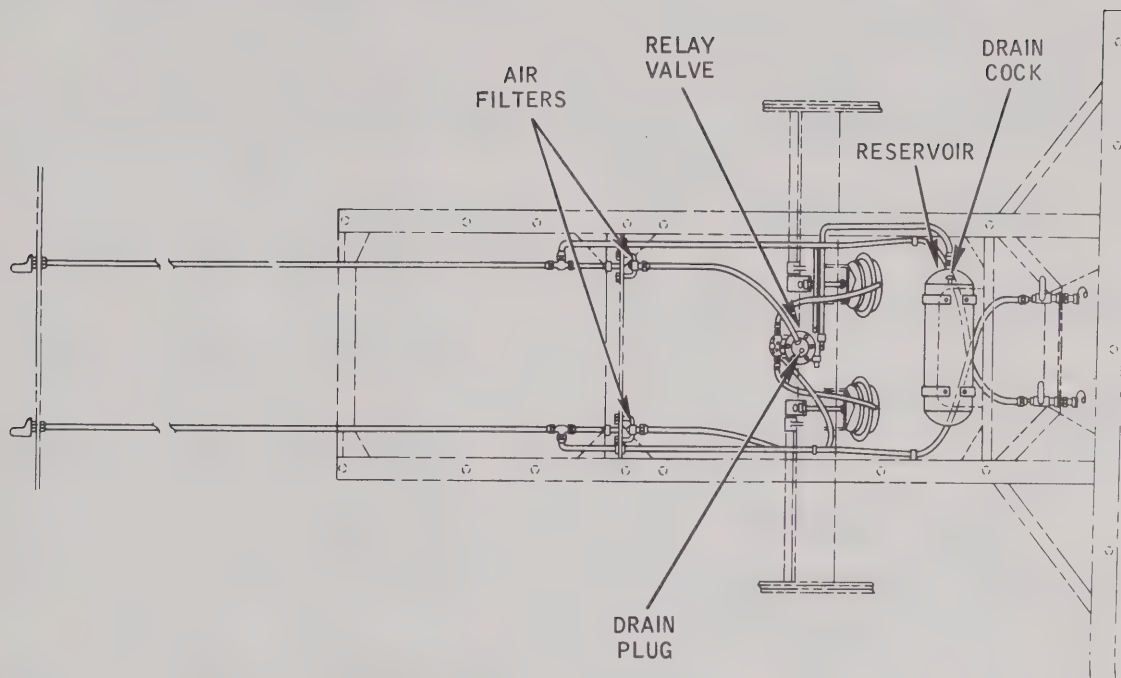


Figure 5-3. Airbrake system moisture drainage.





## 5-1.22. PROCEDURE

a. Inspect the exterior and underside of the van for loose and damaged stowed items, covers, and air filters. Replace or tighten them as necessary.

b. Inspect the exterior of the van for corrosion and paint blisters. Clean and repaint as necessary.

c. Coat the exterior of the van with a soap and water solution, using the sponge.

d. Rinse the exterior of van well using a hose and water.

e. Apply preservative lubricating oil to all unfinished metal surfaces of the van exterior and to the equipment stored under the van, except for the ladders, folding steps, and walking surfaces of platforms.

f. Inspect all cable connectors for loose connections and physical damage.

5-1.23. AIRBRAKE SYSTEM INSPECTION AND CLEANING.

5-1.24. The purpose of this routine is to inspect the power amplifier van air-brake system for leaks. The prime mover is required for performing this routine. Also required are a soap and water solution and a brush. Proceed as follows:

a. Connect the prime mover brake system to the Power Amplifier Van brake system.

b. Coat all air hoses, air hose fittings, and couplings with a soap and water solution.

c. Observe the airbrake system for soap bubbles which indicate air leakage. Tighten the fittings and couplings or replace parts as required.

d. Disconnect the prime mover brake system from the van brake system.

5-1.25. PIONEER KIT INSPECTION AND CLEANING.

## 5-1.26. GENERAL INFORMATION

a. The purpose of this routine is to inspect and clean the pioneer kit.

b. The approximate time required for the performance of this routine is 15 minutes.

## 5-1.27. MATERIALS REQUIRED

a. Cleaning solvent, Federal Specification P-S-661.

**WARNING**

Prolonged contact of skin with cleaning solvent or inhalation of fumes is dangerous. Make sure adequate ventilation is provided.

b. Clean, dry cloths

c. Preservative lubricating oil, Federal Specification VV-L-820B

d. Sandpaper, #000

#### 5-1.28. PROCEDURE

- a. Locate the pioneer kit (mattock pick, single bit ax, and shovel) on the curbside door.
- b. Remove and inspect the pioneer kit tools for cracked or broken handles and metal parts. Check that all handles fit tightly.
- c. Inspect all metal surfaces for corrosion. Clean all tools with solvent and cloths as required. If necessary, use sandpaper to remove corrosion.
- d. Lightly coat the metal surfaces of the tools with preservative lubricating oil and replace them in the rack.

#### 5-1.29. FIRE EXTINGUISHER INSPECTION.

5-1.30. The purpose of this routine is to inspect the power amplifier van fire extinguishers. A spring scale (0-25 pound capacity) is required. Proceed as follows:

- a. Remove one fire extinguisher from its mounting bracket.
- b. Place the fire extinguisher on the scale and observe its weight. If the extinguisher weighs less than 15-1/2 pounds, replace it with a new or recharged extinguisher of the required weight.
- c. Replace the fire extinguisher in its bracket.
- d. Perform steps a through c with the remaining two fire extinguishers.
- e. Return any underweight fire extinguishers to the depot for recharging.

#### 5-1.31. TARPAULIN INSPECTION AND CLEANING.

5-1.32. The purpose of this routine is to inspect and clean the tarpaulin. A bar of issue soap, an approved fungus-mildew resistant solution, and a stiff brush are required. Proceed as follows:

- a. Shake the tarpaulin thoroughly to remove all loose dirt; air the tarpaulin for several hours.
- b. Inspect the tarpaulin for mildew; remove any mildew with a dry brush.
- c. Inspect the tarpaulin for evidence of rotting or weakening of fabric by stretching or pulling it. Replace the tarpaulin if necessary.
- d. Remove any oil or grease from the tarpaulin by scrubbing it with issue soap and warm water. Rinse the tarpaulin well with clean water and allow it to dry.
- e. Inspect the tarpaulin for loose or broken grommets and rips or tears in the fabric. Have any defects repaired immediately.
- f. Treat the tarpaulin with an approved fungus-mildew resistant solution. Allow to dry, and stow it in the van.

#### 5-1.33. LUBRICATION.

#### 5-1.34. GENERAL INFORMATION

- a. The purpose of this routine is to lubricate the Power Amplifier Van and to apply a coat of preservative on unfinished surfaces.
- b. The approximate time required for the performance of this routine is 1 man-hour.



## 5-1.35. MATERIALS REQUIRED

- a. Automotive lubricating grease, Federal Specification MIL-G-10924B
- b. Preservative lubricating oil, Federal Specification W-L-820B

## NOTE

When lubricating external points, use medium weight preservative lubricating oil for temperatures above +32 degrees Fahrenheit and light-weight preservative lubricating oil for temperatures of +32 degrees Fahrenheit to -65 degrees Fahrenheit.

- c. Cleaning solvent, Federal Specification P-S-661.
- d. Clean, dry cloths
- e. Grease gun
- f. Oil can

## 5-1.36. PROCEDURE

## NOTE

Clean all lubrication fittings with a cleaning solvent and dry them with a clean cloth before performing the lubrication procedures.

- a. Fill the crank (1, figure 5-4) and gear box (2, figure 5-4) grease fittings on each landing gear with automotive lubricating grease. Wipe off all excess grease on the exterior of the grease cups and surroundings areas with a clean cloth.

b. Fill the grease fittings (3, fig. 5-4) at the bottom of the support leg housing on each landing gear with automotive lubricating grease until the grease appears at the bottom of the housing.

c. Fill the grease fittings on the locks of the personnel ladder with automotive lubricating grease.

d. Lubricate the leveling jack screw with preservative lubricating oil.

e. Lubricate all door hinges, latches, and the landing gear crankshaft with preservative lubricating oil.

f. Apply automotive lubricating grease by hand to cover the king pin and fifth wheel plate at the front of the van.

g. Lubricate the Pintel hook (at rear of van below center of doors) with automotive lubricating grease.

h. Lubricate the Pintel hook (at front of van behind fifth wheel plate) with automotive lubricating grease.

i. Apply preservative lubricating oil to all unfinished metal surfaces of van, tools, toolbox, and equipment stowed under van with the exception of the ladders, steps, and walking surfaces of platforms.

j. Lubricate the grease fitting on each airbrake mechanical linkage (1, figure 5-5) with automotive lubricating grease.

k. Lubricate the linkage arms (2, figure 5-5) with preservative lubricating oil.

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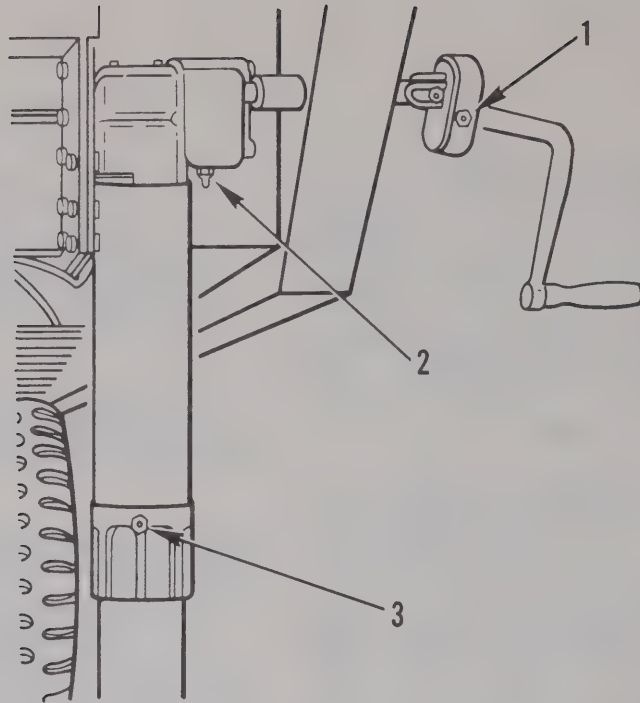


Figure 5-4. Landing gear lubrication.

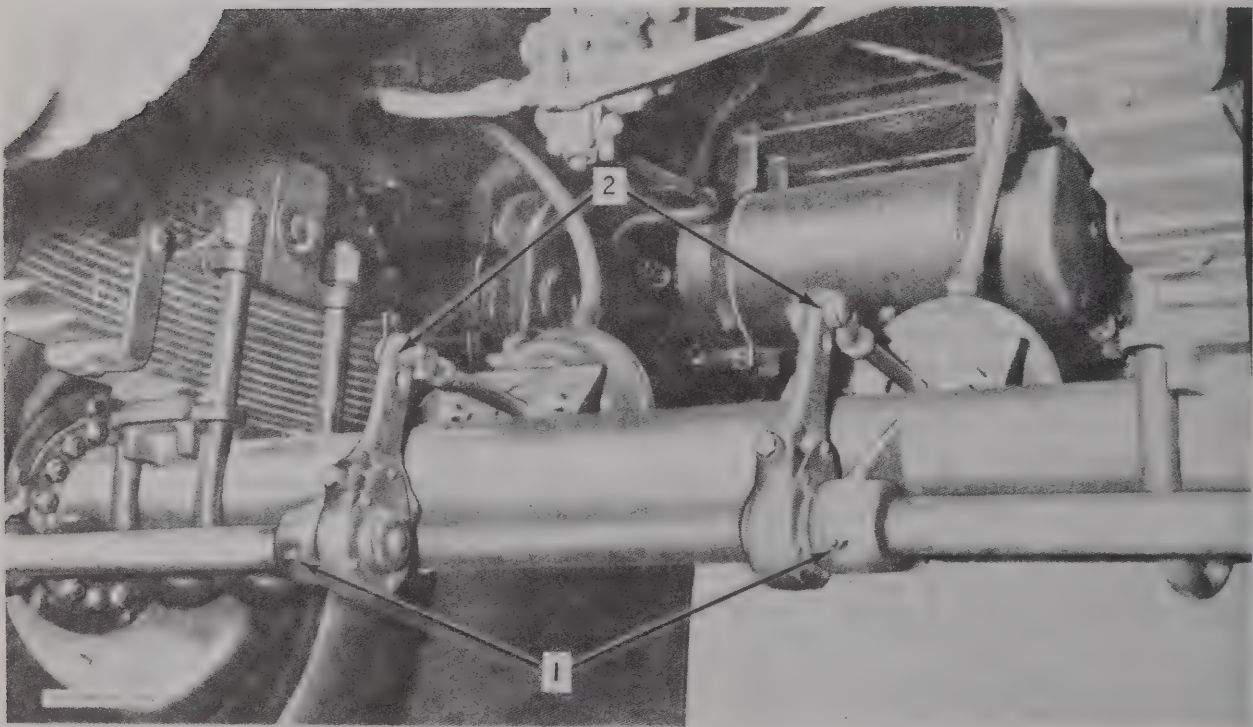


Figure 5-5. Airbrake linkage lubrication.

## 5-1. 37. AIRBRAKE AIR FILTERS INSPECTION AND CLEANING

### 5-1. 38. GENERAL INFORMATION

a. The purpose of this routine is to clean and inspect the airbrake air filters.

b. The approximate time required for the performance of this routine is 30 minutes.

#### NOTE

The prime mover is required for performing this routine.

### 5-1. 39. MATERIALS REQUIRED

a. Cleaning solvent, Federal Specification P-S-661.

b. Soap and water solution.

c. Clean, dry cloths.

d. Two adjustable wrenches, 10 inch.

e. Prime mover.

### 5-1. 40. PROCEDURE

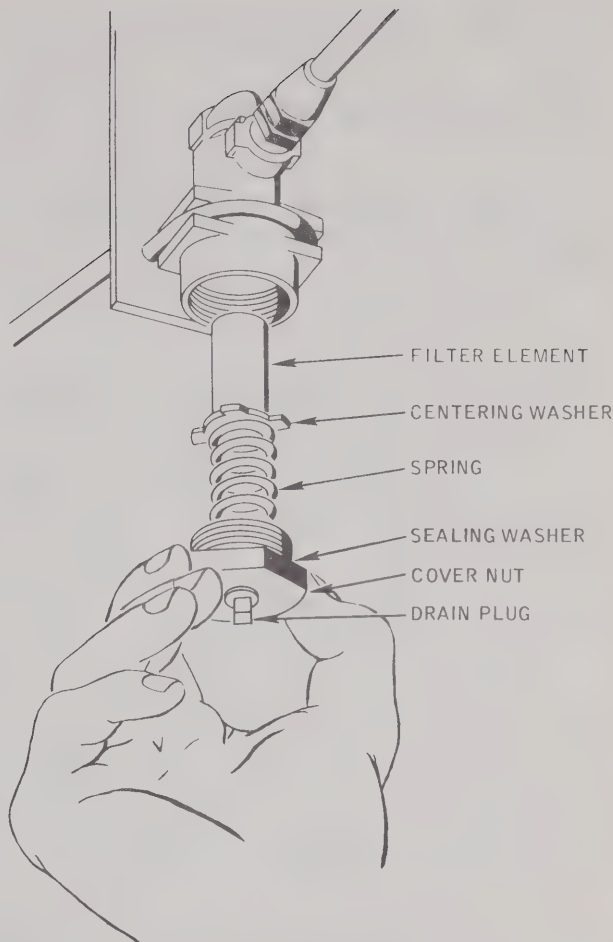
#### WARNING

Before performing this routine check that both landing gear sand pads are resting firmly on the ground. Insure that cranks are removed from gearboxes and wheel chocks are firmly in position.

a. Hold the body of the air filter with an adjustable wrench to keep it from being twisted; using the other adjustable wrench; unscrew the cover nut from the body. As the nut is being removed, the sealing washer, spring, centering washer, and filter element will come from the body (fig. 5-6).

b. Clean all metal parts, including the inside of the body, with cleaning solvent.

c. Dust the filter element and rinse it with cleaning solvent. Replace the element if it is damaged or impregnated with oil or gummy deposit.



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Figure 5-6. Airbrake air filter.

d. Check the sealing washer before installing it on the nut. Replace the sealing washer if it is unserviceable.

e. Place the spring, centering washer, and filter element on the cover nut. Press the parts into the body, and screw the nut into the body. Tighten the cover nut with an adjustable wrench while securing the body of the air filter with the other adjustable wrench to keep it from being twisted.

#### NOTE

Two people will be required to perform steps *f* through *k* below; one person should apply the van brakes from the prime mover while the other applies the soap solution and observes any leakage.



*f.* Connect the van brake system to the prime mover brake system and apply the van brakes.

*g.* Apply the soap solution to the air filter connections.

*h.* Observe any soap bubbles indicating air leakage. Tighten the fittings or replace parts as required.

*i.* Release the brakes.

*j.* Repeat the procedure in steps *a* through *h* above for the other air filter.

*k.* Disconnect the prime mover brake system from the van brake system.

## 5-1. 41. 24-VOLT LIGHTING SYSTEM INSPECTION

### 5-1. 42.

The purpose of this routine is to inspect the 24-volt lighting system for proper operation. The prime mover is required for performing this routine. Proceed as follows:

*a.* Connect the prime mover electrical cable to the power amplifier van electrical connector located at the lower front of the van.

*b.* Apply the van brakes in the prime mover and observe the van blackout stoplight and the two standard stoplights. Replace the bulbs if necessary.

*c.* Release the van brakes.

*d.* Turn on the van running lights from the prime mover. Observe the running lights at each upper corner of van, and replace the bulbs if necessary.

*e.* Turn on the van taillights from the prime mover. Observe the taillights at the rear of the van and replace the bulbs if necessary.

*f.* Turn on the van dome lights using the switch located in the van on the curbside wall (next to double doors). Observe the van dome lights and replace bulbs if necessary.

*g.* Turn off the van dome, tail, and running lights and disconnect the prime mover electrical cable from the lower front of the van.

## 5-1. 43. TIRE INSPECTION

### 5-1. 44.

The purpose of this routine is to determine whether the tires are in satisfactory condition. A tire gauge is required. Proceed as follows:

**WARNING**

Before performing this routine check that both landing gear sand pads are resting firmly on the ground. Insure that cranks are removed from gear boxes and wheel chocks are firmly in position.

a. Inspect the tires for any penetrating objects, stones, cuts, abrasions, unusual wear, or missing valve caps.

b. Remove any penetrating objects or stones from the tires.

c. Remove the valve caps and gauge the tires for proper pressure under the applicable following conditions:

- (1) Standby - 60 psi
- (2) Highway driving - 70 psi
- (3) Cross-country driving - 50 psi
- (4) Sand driving - 25 psi

d. Inflate any tire which is below the prescribed pressure, and replace all valve caps.

e. Raise one side of the van slightly, using the leveling jack, so that the wheels may be rotated freely.

f. Rotate the wheels on the raised side of the van 180 degrees and lower the leveling jack to its former position.

g. Perform steps e and f for the other side of the van.

## SECTION II

### ORGANIZATIONAL/FIELD MAINTENANCE

5-2. GENERAL. This section provides instructions on an equipment level. However, equipment contained in the power amplifier van and not covered here such as the 10-kw power amplifier, parametric amplifier, etc., are covered in separate TM's listed in Appendix A. The instructions given in this section supplement the procedures contained in Section I. In performing organizational/field maintenance procedures, refer to the applicable schematic diagrams contained in Chapter 6 and to the appropriate illustrations in TM 11-5820-762-25P.

#### 5-3. TEST EQUIPMENT.

5-4. The test equipment required to perform the organizational/field maintenance instruc-

tions given in this section is listed in table 5-1. The operating characteristics listed in table 5-1 are those required for testing the power amplifier van and do not necessarily represent the maximum capabilities of the test equipment. Other test equipment required for maintenance of the individual equipments contained within the power amplifier van are covered in separate TM's listed in Appendix A.

#### 5-5. PERFORMANCE TEST STANDARDS.

5-6. Performance test standards for the power amplifier van are covered in Section I. For performance test standards of individual equipment not covered therein, refer to the applicable equipment TM's listed in Appendix A.

## 5-7. DC VOLTAGE REQUIREMENTS AND SOURCES.

5-8. The only dc voltage requirement and source for the power amplifier van is the +24 vdc from the prime mover.

## 5-9. TROUBLESHOOTING.

5-10. Tables 5-2 and 5-3 contain troubleshooting information to aid you in locating and correcting some of the troubles which may develop in the power amplifier van.

## 5-11. POWER AMPLIFIER VAN ELECTRICAL AND ELECTRONIC MAINTENANCE.

### 5-12. PRIMARY VOLTAGE DISTRIBUTION CIRCUITRY.

5-13. POWER ENTRANCE BOX. Maintenance of the power entrance box (see fig. 2-15) consists of insuring that all connections are secure and that primary power input connector J415 and GND studs are free from corrosion.

#### **WARNING**

Before working on the power entrance box, ascertain that 120 vac power to the power amplifier van is removed at the diesel generator van.

5-14. Remove the power entrance box cover at least once a year and inspect the interior of the box for moisture or damage. If moisture is found, examine the connecting gaskets between connectors J415 and J416 and the power entrance box. Replace these gaskets, if necessary, by removing the eight screws holding J415 and J416 and the gaskets to the power entrance box.

5-15. MAIN CIRCUIT BREAKER. Maintenance of the main circuit breaker is limited to removal and replacement. To replace the main circuit breaker, proceed as follows:

#### **WARNING**

Disconnect the power entrance cable from primary power input connector J415 in the power entrance box before removing the cover from the main circuit breaker box.

a. Remove four screws and the cover from main circuit breaker box.

b. Loosen six inserts securing power cables to main circuit breaker.

c. Remove the main circuit breaker by removing attaching hardware.

d. Install the main circuit breaker by performing the reverse of steps a through c.

5-16. CIRCUIT BREAKERS CB427 and CB428. Maintenance of circuit breakers CB427 and CB428 (identical 125-ampere circuit breakers) is limited to removal and replacement. To replace CB427 or CB428, proceed as follows:

#### **WARNING**

Disconnect the power entrance cables from power input connectors J415 and J416 in the power entrance box before removing the covers from each circuit breaker box.

a. Remove four screws and cover from each circuit breaker box.

b. Loosen 12 inserts securing power cables to each of these circuit breakers.

c. Remove each circuit breaker by removing attaching hardware.

d. Install each circuit breaker by performing the reverse of steps a through c.

5-17. POWER MONITOR PANEL. Malfunctioning of the primary ac power is indicated by abnormal indications on the FREQUENCY meter and/or the VOLTAGE meter of the POWER MONITOR panel. Normal indications are  $120 \pm 6$  vac and  $60 \text{ cycles} \pm 2$ . When an abnormal indication is noted, check the primary ac power source and adjust if possible. If the trouble is not due to malfunctioning of the primary ac power source, a complete maintenance check of the POWER MONITOR panel may be necessary (see table 5-2).

5-18. DISTRIBUTION BOX. Maintenance of the DISTRIBUTION BOX is limited to removal and replacement of the individual circuit breakers. To replace the circuit breakers proceed as follows:



Table 5-1. Test Equipment

Federal Stock Number	Nomenclature	Characteristics
6625 724 8582	Multimeter AN/PSM-6 ( ) or equivalent	AC VOLTAGE: 0 vac to 250 vac  DC VOLTAGE: 0 vdc to 50 vdc 0 vdc to 250 vdc  DC RESISTANCE: 0 ohms to 1000 ohms

Table 5-2. Primary AC Power Troubleshooting Chart

Symptom	Probable Cause	Recommended Correction
1. No indication on FREQUENCY meter and/or VOLTAGE meter of POWER MONITOR	(a) Defective power cable and/or connections between diesel generator van and power amplifier van (b) MAIN CIRCUIT BREAKER defective or defective connections (c) POWER MONITOR phase selector FREQUENCY meter, VOLTAGE meter or internal wiring defective	(a) Check power cable and connectors (see schematic diagram fig 6-2); repair or replace as necessary (b) Repair or replace as necessary (c) De-energize equipment and make continuity tests of POWER MONITOR; replace components as necessary
2. Overhead light(s) inoperative	(a) Faulty bulb (b) VAN LIGHTS circuit breaker defective or defective connections (c) Light switches or sockets defective	(a) Replace bulb (b) Repair or replace as necessary (c) Repair or replace as necessary
3. Equipment connected to convenience outlet(s) inoperative	(a) Associated circuit breaker on DISTRIBUTION BOX defective (b) Defective connecting cables and/or convenience outlet	(a) Repair or replace as necessary (b) Using multimeter, check for presence of 120 $\pm$ 6 volts ac at convenience outlet; if necessary, de-energize equipment and make continuity check
4. Parametric amplifier Type 959 inoperative as indicated by associated lamp or parametric amplifier power control panel	(a) Indicator lamp faulty (b) Associated circuit breaker on parametric amplifier power control panel defective (c) Defective connecting cables	(a) Replace lamp (b) Repair or replace as necessary (c) De-energize equipment and make continuity check with multimeter; replace or repair wires as necessary

Table 5-3. Mechanical and 24-Volt DC Troubleshooting Chart

Item	Symptom	Probable Cause	Recommended Correction
Brake System	1. Brake will not release	(a) Emergency relay valve in applied position	(a) If van is coupled to tractor, build up pressure in van brake system; if van is uncoupled, open drain cock on air reservoir
		(b) Air hoses improperly connected to tractor	(b) Check the two air hoses and couplings connected to the tractor
		(c) Brake valve on tractor in applied position	(c) Release brake valve
		(d) Restriction in air lines or hoses	(d) Check all lines and hoses
		(e) Shutoff valves on tractor air hoses in closed position	(e) Open shutoff valve
		(f) Weak or broken brake retract spring	(f) Replace spring (para 5-58)
	2. Brakes do not function or are weak	(a) Shutoff valves on tractor air hose in closed position	(a) Open shutoff valves
		(b) Air hoses improperly connected to tractor	(b) Check the two air hoses and couplings connected to the tractor
		(c) Air reservoir drain cock open	(c) Close drain cock
		(d) Low air pressure	(d) Check for normal air pressure of tractor; perform the Air Brake System Inspection routine in the Preventive Maintenance Workcard Set
		(e) Defective relay valve	(e) Replace valve (para 5-66)
		(f) Defective air chamber	(f) Replace air chamber (para 5-64)
		(g) Clogged air cleaner	(g) Clean or replace air cleaner filter element
		(h) Grease on brake lining	(h) Replace brake lining (para 5-57); check source of grease leakage and repair
		(i) Brake lining worn	(i) Adjust brakes (para 5-59)
		(j) Brake lining worn to level of lining bolts	(j) Replace brake lining (para 5-57)
The +24-volt lighting system	3. +24-volt lighting does not function	(a) +24-volt cable not properly plugged into receptacle on tractor	(a) Remove cable connector and insert properly
		(b) Light switch on tractor is not set properly	(b) Set switch to proper position
		(c) No current from tractor	(c) Check fuses and wiring on tractor
		(d) Broken or shorted cable	(d) Replace cable
	4. One or more +24-volt lights will not illuminate	(a) Burned out lamp(s)	(a) Replace lamp(s)
		(b) Dirty or corroded lamp socket	(b) Remove lamp and clean contacts as necessary

Table 5-3. Mechanical and 24-Volt DC Troubleshooting Chart (cont)

Item	Symptom	Probable Cause	Recommended Correction
Landing gear	5. Dim or flickering +24-volt lights	(a) Loose ground wire	(a) Clean and tighten terminals on ground wire in back of receptable on van
		(b) See Symptom: 24-volt lighting does not function	
	6. Crank very difficult to turn	(a) Lack of lubrication	(a) Lubricate fittings on gear box and strut
		(b) Bent crank shaft or level gear shaft	(b) Replace (para 5-76)
		(c) Bent or dented lower leg	(c) Replace (para 5-77)
(d) Damaged bearings		(d) Replace (para 5-79)	
Suspension system	7. Trailer not tracking properly	(a) Axle not aligned	(a) Adjust roadside radius rod
		(b) Broken springs	(b) Replace broken leaf or spring (para 5-51)

**WARNING**

Before removing the DISTRIBUTION BOX cover, set main circuit breaker to OFF.

- a. Remove the DISTRIBUTION BOX cover. (See fig. 6-13.)
- b. Remove the circuit breaker attaching hardware.
- c. Pull the circuit breaker to release the spring clips attached to the conductors.
- d. Install the circuit breaker by performing the reverse of steps a through c.

## 5-19. REGULATED PRIMARY AC POWER.

5-20. Malfunctioning of the regulated primary ac power will cause erratic operation of the parametric amplifiers and frequency converters. When the regulated primary ac power is suspected of being faulty, check the ac voltage across terminals 4 and 5 of 3TB2 located in each of the two 10-kw power amplifiers. The voltage should be  $120 \pm 2$  vac. If the voltage is incorrect, refer to applicable TM for the 10-kw power amplifier. If voltage is correct, check the parametric amplifier power control panel (see table 5-2) and repair or replace as necessary. This power control panel is mounted with four panhead 10-32 screws, and is easily installed or removed.

## 5-21. THE 24-VOLT DC EMERGENCY LIGHTING.

5-22. Malfunctioning of the +24-volt dc emergency lighting will be indicated by failure of the power amplifier van exterior lighting and/or the three interior emergency lights. When a trouble is indicated, inspect the +24-volt dc input connector located at the lower front wall of the power amplifier van for damage. Make sure the connection to the prime mover cable is satisfactory. If further inspection is required, refer to table 5-3.

**NOTE**

When the +24-volt dc emergency lighting circuit is not being used, insure that the dust covers for the +24-volt dc input connector and the rear receptacle are in place.

## 5-23. SIGNAL LINE EXTENSION BOX.

5-24. Maintenance of the signal line extension box consists of inspection, removal, and repair of its components. Remove the cover plate on the inside of the power amplifier van at least once a year and inspect the interior of the signal line extension box for moisture or damage. If moisture is found, examine the gasket tape between the panel and frame. Examine the gaskets between the individual connectors and panel. Replace gasket tape or gaskets if evidence of leakage is found.



## 5-25. WAVEGUIDES.

5-26. Maintenance of the waveguides and associated hardware is limited to inspection, removal and replacement. Refer to the waveguide installation procedures in Chapter 2 and perform the reverse of these procedures to remove and replace faulty components.

## 5-27. ROOF FEEDTHROUGHS.

5-28. TRANSMIT FEEDTHROUGH. The two 3-1/8-inch transmit feedthroughs, if faulty, will cause erratic or intermittent transmission from the 10-kw power amplifiers. If these symptoms are noted, ascertain that the 10-kw power amplifiers are operating normally. Check each feedthrough for dirt, loose connecting hardware, and loose plugs. Replace the feedthrough if it is cracked or otherwise damaged.

5-29. RECEIVE FEEDTHROUGH. If faulty, the two 1-5/8-inch coaxial receive feedthroughs will cause erratic or intermittent reception from the associated parametric amplifier and converter. If these symptoms are noted, ascertain that the associated parametric amplifier and converter are operating normally. Check each receive feedthrough for dirt, loose connecting hardware and loose plugs. Replace as necessary if the feedthrough is cracked or otherwise damaged.

## 5-30. POWER AMPLIFIER VAN MECHANICAL MAINTENANCE.

### 5-31. GENERAL.

5-32. The instructions for mechanical maintenance are grouped according to mechanical assemblies. Whenever removal or installation of parts is necessary, refer to the applicable assembly drawing in TM 11-5820-762-25P along with the removal and installation instructions herein.

### 5-33. WHEELS AND TIRES.

5-34. WHEEL REMOVAL. Remove the wheels from the hub in the following manner:

#### NOTE

Wheel nuts on the curbside of the van have right hand threads and wheel nuts on the roadside of the van have left hand threads.

a. Loosen the 10 wheel capnuts, using the wheel nut wrench supplied in the van tool box.

b. Raise the van, using the leveling jack, until the dual wheels clear the ground.

c. Remove the outer wheel hex capnuts and pull off the outer wheel.

d. Remove the inner wheel square capnuts and pull off the inner wheel.

5-35. WHEEL REPLACEMENT. Install the wheels on the hub in the following manner:

a. Position the inner wheel on the 10 mounting studs in the hub, and install the 10 squarehead capnuts.

#### NOTE

Insure that the valve stems of the outer and inner wheels are not aligned when positioning the outer wheel.

b. Position the outer wheel on the capnuts and install the 10 hexhead capnuts.

c. Lower the wheels to the ground and check the tightness of all nuts.

5-36. TIRE REMOVAL. Remove the tire from the wheel in the following manner:

a. Remove the wheel from the hub (para 5-34).

b. Using the valve cap, unscrew and remove the valve core to deflate the tire.

c. Place the small end of the tire iron in the slot between the split ring, and pry the end of the split ring from its groove in the wheel rim. Place another tire iron under the pried-up end to hold it until the next portion is pried up; remove the split ring in this manner.

d. Turn the wheel over and block it up approximately six inches off the ground.

e. Push the valve stem into the tire through the slot in the wheel rim.

f. Press and pry on the tire bead to remove it from the wheel rim.

g. Force the tire casing off the wheel rim.

h. Remove the tire flap and tube from the tire.

5-37. **TIRE REPLACEMENT.** Install the tire on the wheel in the following manner:

a. Place the tube and tire flap inside the tire.

b. Place the wheel on blocks approximately an inch above the ground, with the beaded edge downward.

c. Place the tire onto the wheel with the valve stem aligned with the slot in the wheel rim.

d. Force the tire casing onto the rim.

e. Place the split ring onto the wheel and start one end under the bead.

f. As a portion of the split ring goes into place, force the rest of the ring into place.

g. Inflate the tire slightly and pound the casing on both sides of the tire to insure that the tube fits smoothly inside the casing.

### CAUTION

Do not inflate tires to over 75 pounds pressure.

h. Inflate the tire to the proper pressure as listed in table 1-4.

i. Install the wheel on the hub (para 5-35).

5-38. **HUBS AND BRAKEDRUMS.**

5-39. **REMOVAL OF HUB AND BRAKEDRUM.** Remove the hub and brakedrum from the axle in the following manner:

a. Remove the wheels from the hub (para 5-34).

b. Unscrew the drain cock on the air reservoir to relieve pressure in the brake system.

c. Remove the hubcap and gasket by unscrewing and removing the six screws securing the hubcap.

d. Unscrew and remove the outer bearing

adjusting nut, using the wheel bearing adjusting nut wrench supplied in the van tool box.

e. Remove the self-locking nut from the spindle.

f. Remove the inner wheel bearing adjusting nut, using the wheel bearing adjusting nut wrench.

g. Remove the outer bearing cone from the axle spindle by rocking the hub and drum assembly back and forth slightly to loosen the outer bearing cone.

h. Pull the hub and drum assembly from the axle spindle.

i. Remove the inner bearing cone.

j. Examine the grease retainer assembly for damage or wear. Replace if necessary.

5-40. **CLEANING AND LUBRICATION OF WHEEL BEARING AND HUB.** Clean and lubricate the wheel bearing and hub in the following manner:

### WARNING

Prolonged contact with dry cleaning solvent or inhalation of fumes is dangerous. Provide adequate ventilation.

a. Wash the inner and outer bearing cones, hub, and spindle with dry cleaning solvent, Fed Spec O-T-620a; use a brush to remove old or gummy lubricant.

b. Inspect the cones, cups, and hub for indications of wear, cracks, or other damage; replace parts if necessary.

### CAUTION

Insure that no particles of dirt or foreign matter enter the bearings or are deposited on the hub, drum, or spindle.

c. Pack the bearings with grease, MIL-G-10924; insuring that the lubricant is forced between the rollers and inside cone.



d. Apply a thin coating of (not over 1/16 inch) grease, MIL-G-10924, to the inside surface of the spindle.

5-41. INSTALLATION OF HUB AND BRAKE-DRUM ASSEMBLY ONTO AXLE. Install the hub and brakedrum assembly onto the axle in the following manner:

**CAUTION**

Insure that the grease re-tainer assembly is correctly positioned before installing the inner bearing cone.

a. Position the inner bearing cone inside the cup in the hub.

b. Slide the hub and drum assembly onto the spindle.

c. Position the outer bearing cone inside the hub cup and then install the inner spindle nut.

d. Tighten the inner bearing adjusting nut with the wheel bearing adjusting nut wrench while turning the hub and drum assembly by hand; tighten the nut until the assembly binds on the spindle.

e. Back off wheel bearing nut approximately 1/8 of a turn.

f. Check the bearing adjustment by grasping the drum and attempting to rock it on the spindle. If the bearings are properly adjusted, movement of the hub and drum assembly will scarcely be visible in relation to the backing plate. The hub and drum assembly should turn freely on the spindle. If axial movement is over 1/32 of an inch, further adjustment is necessary.

**CAUTION**

Do not disturb the adjustment of the inner wheel bearing adjusting nut while performing step g.

g. Install the self-locking nut on the spindle against the inner bearing adjusting nut.

h. Install the outer bearing adjusting nut against the self-locking nut.

i. Check the bearing adjustment again as in step f.

j. Install the gasket and hubcap with the six screws provided.

k. Install the wheels (para 5-35).

5-42. REMOVAL OF BRAKEDRUM FROM HUB. Remove the brakedrum from the hub in the following manner:

a. Remove the wheels from the hub (para 5-34).

b. Remove the hub and brakedrum assembly from the axle (para 5-39).

c. Remove the 10 nuts on the inside of the brakedrum and carefully drive out the wheel studs (drive away from inside of brakedrum).

5-43. INSTALLATION OF BRAKEDRUM ON HUB. Install the brakedrum on the hub in the following manner:

a. Position the hub on the brakedrum with the 10 wheel studs and holes aligned.

b. Carefully drive the 10 wheel studs (flanges up) into the aligned wheel stud holes in the hub and brakedrum. Insure that all wheel studs are driven to their full limit into the hub and brakedrum.

c. Check all nuts for tightness.

5-44. REMOVAL OF BEARING CUPS IN HUB. Remove the bearing cups from the hubs in the following manner:

a. Remove the brakedrum from the hub (para 5-42).

b. Place one end of the hub on blocks that will not interfere with the removal of the bearing cups.

c. Carefully drive out one of the bearing cups, using a hammer and tire iron or soft metal bar.

d. Turn hub over and remove other cup in a similar manner.

5-45. INSTALLATION OF BEARING CUPS IN HUBS. Install the bearing cups in the hub in the following manner:

a. Place end of hub on solid surface and



position bearing cup over cup seat with large end of tapered bore facing up.

#### NOTE

The larger bearing cup is inserted in the brakedrum side of the hub and the smaller bearing cup in the wheel side of the hub.

- b. Carefully drive one of the bearing cups in with a hammer and soft metal bar.
- c. Turn the hub over and install the remaining bearing cup in a similar manner.
- d. Insure that both bearing cups are fully seated.

#### 5-46. SUSPENSION SYSTEM.

5-47. REMOVAL OF AXLE ASSEMBLY. Remove the axle assembly in the following manner:

- a. Extend the leveling jack and landing gear assemblies high enough so that the tires barely touch the ground.
- b. Open the air reservoir drain cock to depressurize the brake system.
- c. Remove both sets of dual wheels (para 5-34).
- d. Remove both hub and brakedrum assemblies (para 5-39).
- e. Disconnect the two flexible air hoses connected from the relay valve to the air chambers.

f. Place blocks or empty packing cases underneath the axle assembly to support it after removal.

g. Remove the two hex nuts and lockwashers from each spring U-bolt and remove the four U-bolts.

h. Remove the axle assembly from under the van.

5-48. INSTALLATION OF AXLE ASSEMBLY. Install the axle assembly in the following manner:

a. Raise the axle assembly with jacks, and block it up in the proper position.

#### NOTE

The nut of each spring center bolt must fit into the recess in each axle spring seat.

- b. Attach the axle assembly to the springs with the four U-bolts, eight lockwashers, and nuts.
- c. Connect the two flexible air hoses from the relay valve to the brake air chambers.
- d. Install the hub and drum assemblies (para 5-41).
- e. Install both set of dual wheels (para 5-35).
- f. Perform the axle alignment routine in Section I for the power amplifier van.

5-49. REMOVAL OF SPRING ASSEMBLY. Remove the spring assembly in the following manner:

- a. Jack up the van, using the leveling jacks, until the tires barely touch the ground.
- b. Loosen the four U-bolt nuts on the end opposite the spring assembly to be removed.
- c. Remove the four U-bolt nuts and lockwashers from the spring assembly and then remove the two U-bolts.
- d. Remove the two long bolts which retain each end of the spring in its hanger.
- e. Raise the leveling jacks, if necessary, and remove the spring assembly.

5-50. INSTALLATION OF SPRING ASSEMBLY. Install the spring assembly in the following manner:

a. With the van jacked up and the axle and wheel assembly properly located, install the spring assembly with the nut of the center bolt located in the recess of the spring seat and the bent ends of the top leaf fitted into the hangers.

b. Install the two bolts in the spring hangers under the spring leaf with the bent ends.

c. Place the radius rod bracket on top of the spring and install the two U-bolts, using the four lockwashers and nuts.

d. Tighten the U-bolt nuts on opposite ends of the axle.

- e. Check all nuts for tightness.

**5-51. REPLACEMENT OF SPRING LEAVES.** To replace one or more spring leaves, proceed as follows:

- a. Remove the spring assembly (para 5-49).
- b. Clean mud and dirt from all parts with water and a stiff brush.
- c. Clamp the spring assembly in a large C-clamp near the center bolt to hold the leaves in tension after the small leaf clips, large leaf clips, and center bolt have been removed.
- d. File or grind the peened ends from the four clip bolts and center bolt.
- e. Remove the hex nuts from the four clip bolts and the center bolt.
- f. Gradually relieve tension of leaves by releasing the C-clamp separate leaves.

### WARNING

Prolonged contact with dry cleaning solvent or inhalation of fumes is dangerous; provide adequate ventilation.

- g. Clean each leaf with dry cleaning solvent, Fed Spec O-T-620a. Remove rust by brushing or sanding lightly.
- h. Inspect each leaf for cracks, breaks, or other damage; replace defective leaves.
- i. Assemble the leaves in the proper order, starting with the largest leaf.
- j. Align center bolt holes and insert the center bolt through holes.
- k. Place the assembly in a C-clamp; tighten C-clamp around leaves to press them together; install hex nut on center bolt and tighten securely. Peen end of bolt over nut.
- l. Install the four clip bolts, spacers, and hex nuts; clips must be tight enough to hold leaves in alignment but not tight enough to restrict free movement of springs. Peen ends of bolts over nuts.
- m. Install spring assembly (para 5-49).

**5-52. REMOVAL OF RADIUS ROD.** Remove either radius rod in the following manner:

- a. Loosen the setscrew at each end of the rod.
- b. Remove the two nuts from the long bolt at each end of the radius rod.
- c. Pull out the long bolt, two rubber bushings, spindle, and the flat retainers at each end of the radius rod. Remove the radius rod.

**5-53. INSTALLATION OF RADIUS ROD.** Install the radius rod in the following manner:

- a. Position the radius rod in the spring hangar bracket and radius rod bracket.
- b. Position a flat retainer on each side of the radius rod bore and slide a spindle into position at each end. Rotate the spindles so that the pointed setscrews enter the holes in the sides of the spindles.
- c. Install a rubber bushing on each side of each spindle end and secure each end with the long bolt and two nuts.

**5-54. BRAKE SYSTEM.**

**5-55.** Maintenance of the brake system is to be done as required. However, maintenance does not necessarily have to be accomplished in the order of the following paragraphs. (Refer to appropriate illustrations in TM 11-5820-762-25P when performing maintenance on the brake system.)

### NOTE

When the brake system of the van is not in use, the dummy couplings should be connected to the van air lines at the front and back of the van to prevent moisture and foreign matter from entering the system.

**5-56. REMOVAL OF BRAKESHOES.** Remove the brakeshoe and lining assembly in the following manner:

- a. Remove both dual wheels from the hub and drum assembly (para 5-34).
- b. Remove the hub and brakedrum assembly from the axle (para 5-39).
- c. Remove the brake retract spring, using pliers and a screwdriver.
- d. Remove the dust shield from the back of the brake assembly by unscrewing the attaching bolts.



e. Remove the clip ring and washers from the dust shield side of each brake anchor pin.

f. Pull the brake anchor pin out of the assembly from the wheel side of the brake assembly. Retain the wheelside spring clip and washers on each pin.

g. Remove the two brakeshoes and lining from the brake assembly.

**5-57. REPLACEMENT OF BRAKE LINING.** The brake lining should be replaced whenever it is worn within 1/16 inch of the level of the lining bolts. Reline the brake shoes in the following manner:

### CAUTION

Brake lining on both brakeshoes should be replaced at the same time.

a. Remove the hub and brakedrum from the axle (para 5-30).

b. Remove the brakeshoes (para 5-56). Check the brake retract spring and replace if damaged.

c. Unbolt and remove the worn brake lining from the brakeshoes.

### WARNING

Prolonged contact with dry cleaning solvent or inhalation of fumes is dangerous; provide adequate ventilation.

d. Clean the faces of brakeshoes and all internal parts of the brake mechanism with dry cleaning solvent, Fed Spec O-T-620a.

### NOTE

If the brakedrums have been machined to eliminate runout or scoring, install shims, the thickness of the metal removed from the lining.

e. Bolt the new brake lining securely in place and insure that the brake lining bolts are fully countersunk in the linings.

f. Check the contact of the brake lining

with the brakeshoe to be sure that a 0.010-inch feeler gage will not enter between the brake lining and brakeshoe at any point.

g. Install brakeshoes (para 5-58).

h. Install hub and brakedrum on axle (para 5-41).

**5-58. INSTALLATION OF BRAKESHOES.** Install the brakeshoe and lining assembly in the following manner:

a. Place the brakeshoes in their proper position in the brake assembly and insert a brake anchor pin through each brakeshoe from the wheelside of the brake assembly. Insure that the washers and clip ring are still on wheel side of brake anchor pins.

b. Install the washers and clip pin on the dust shield side of each brake anchor pin.

c. Install the dust shield with its attaching bolts.

d. Install the brake retract spring in its proper holes.

e. Install the hub and brakedrum assembly (para 5-41).

f. Install both dual wheels on the hub and drum assembly (para 5-35).

g. Adjust the van brakes (para 5-58).

**5-59. BRAKE ADJUSTMENT.** Adjust the van brake system to compensate for brake lining wear or replacement in the following manner:

### WARNING

Insure that wheel chocking blocks are in place to prevent movement of the van before releasing brakes.

a. Close the shut off cocks on the air lines of the tractor.

b. Relieve the air pressure in the brake system by opening the drain valve on the air reservoir.

c. Remove the dust shield on each brake drum by unscrewing the attaching bolts.



d. Remove the cotter pin which secures the large pin that holds an air chamber arm to the slack adjuster; remove the large pin.

e. Loosen the locking nut on the air changer arm length adjustment.

f. While observing the position of the brake lining, pull the slack adjuster forward with your hand until the brake lining is in full contact with the drum and no more forward movement of the slack adjuster is observed.

g. Adjust air chamber arm length adjustment and temporarily replace the large pin so that the air chamber arm will hold the slack adjuster in the position attained in step f.

h. Remove the pin and back off air chamber arm length adjustment two full turns from its position in step g. This is the correct position for brake operation.

i. Attach slack adjuster to air chamber with the large pin and 2 cotter pins. Do not change preceding adjustment while doing this. Tighten the locknut.

j. Adjust the brakes on the other side of the van as in steps d through i. Perform this adjustment in exactly the same manner to insure equal braking action on both sides of the van.

k. Close the air reservoir drain cock and install dust covers.

**5-60. REMOVAL OF BRAKE SPIDER AND CAMSHAFT ASSEMBLY.** Remove brake spider and camshaft assembly from the axle in the following manner:

a. Remove the hub and brakedrum from the axle (para 5-39).

b. Remove the washer setscrew, lock-washer and plain washer from the end of the camshaft at the slack adjuster.

c. Remove the camshaft lockring at the brake spider and remove the brake retract spring.

d. Loosen the clamp nut on the slack adjuster and pull the camshaft and camshaft spacer washer out from wheel side of brake spider; note positions of the camshaft retainer washer and felt ring.

e. Remove the 16 bolts, washers, and nuts securing the brake spider to the brake flange; remove brake spider assembly from the brake flange.

f. Check the brake flange and spider for cracks or other damage; replace if necessary.

g. Check the 16 brake flange bolts, washers and nuts for stripped threads or other damage; replace if necessary.

**5-61. INSTALLATION OF BRAKE SPIDER AND CAMSHAFT ASSEMBLY.** Install the brake spider and camshaft assembly on the axle in the following manner:

a. Install brake spider assembly on the brake flange with the 16 bolts, washers, and nuts; tighten securely.

b. Insert camshaft and camshaft spacer washer through the brake spider and into the slack adjuster.

c. Install the camshaft lockring at the brake spider.

d. Install the camshaft plain washer, lock-washer, and setscrew thereby attaching the camshaft to the slack adjuster.

e. After checking that camshaft is correctly positioned, securely tighten the clamp nut on the slack adjuster.

f. Install the brake retract spring.

g. Install the hub and brakedrum in place on the axle (para 5-41).

h. Adjust brakes (para 5-59).

**5-62. REMOVAL OF BRAKE AIR CHAMBER.** Remove each air chamber in the following manner:

### WARNING

Insure that wheel chocking blocks are in place to prevent movement of the van before releasing brakes.

a. Close shut off cocks on the air lines of the tractor.

b. Relieve the air pressure in the brake system by opening drain cock on the air reservoir.

c. Disconnect the flexible hose coming from the relay valve.

d. Remove cotter pin and large pin which attach the air chamber arm to the slack adjuster.

e. Remove the two bolts which attach the air chamber to the mounting bracket; remove the air chamber.

**5-63. INSTALLATION OF BRAKE AIR CHAMBER.** Install each air chamber in the following manner:

a. Place the air chamber in its proper position on the mounting bracket, with the arm extending through the hole in the bracket to the slack adjuster.

b. Install the two attaching bolts.

c. Connect the flexible hose from the relay valve to the air chamber.

d. Adjust the van brakes (para 5-59).

**5-64. BRAKE AIR CHAMBER OPERATING TEST.** Test the brake air chamber for proper operation in the following manner:

a. Insure that air hoses are coupled to tractor and that the tractor air shutoff cocks are open.

### WARNING

Insure that wheel chocking blocks are in place to prevent movement of the van.

b. With brakes released, place a straight-edge against the front side of the air chamber bracket and across the air chamber arm; make a pencil mark on the arm to indicate its position in relation to the bracket when brakes are not applied.

c. Apply brakes and again make a pencil mark as in step b: measure the distance between these two pencil marks and release the

brakes. The distance between the marks is the air chamber piston travel.

d. Air chamber piston travel should be between 2-3/16 inches and 2-1/2 inches with the brakes properly adjusted. If piston travel is not at least 2-3/16 inches with brakes properly adjusted or if weak action is observed, the air chamber should be replaced (para 5-63).

**5-65. EMERGENCY RELAY VALVE REMOVAL.** Remove the emergency relay valve in the following manner:

### WARNING

Insure that wheel chocking blocks are in place to prevent movement of the van before releasing brakes.

a. Close shut off cocks in the air lines of the tractor.

b. Relieve air pressure in the brake system by opening the drain valve in the air reservoir.

c. Disconnect the two flexible air hoses, the two 1/4-inch air lines, and the 3/8-inch air line from the relay valve.

d. Remove the two attaching screws nuts, and washers; remove the relay valve.

**5-66. EMERGENCY RELAY VALVE INSTALLATION.** Install the emergency relay valve in the following manner:

a. Position the relay valve on its mounting bracket.

b. Attach the relay valve with two screws, washers, and nuts.

c. Connect the two flexible air hoses, the two 1/4-inch air lines, and the 3/8-inch air line to the relay valve.

d. Close the air reservoir drain cock.

**5-67. EMERGENCY RELAY VALVE OPERATING TEST.** Test the emergency relay valve for proper operation in the following manner:

a. Insure that the two air lines are con-



nected to the tractor and that tractor shutoff cocks are open.

b. Apply the van brakes and check for proper operation.

c. Release the van brakes and check that air pressure is exhausted instantly through the exhaust opening on the emergency relay valve.

d. Close the shutoff cock on the tractor emergency air line and disconnect the emergency air line from the tractor; check that van brakes apply themselves automatically; if they do not, the emergency relay valve is defective and should be replaced (para 5-66).

e. Van brakes may be released by reconnecting the emergency air line and opening the shutoff cock on the tractor.

f. Replace the relay emergency relay valve if it does not function properly.

5-68. AIR CLEANER REMOVAL. Remove each air cleaner in the following manner (refer to fig. 4-2):

**WARNING**

Insure that wheel chocking blocks are in place to prevent movement of van before releasing brakes.

a. Close the shutoff cocks on the air lines of the tractor.

b. Relieve air pressure in the brake system by opening the drain cock on the air reservoir.

c. Unscrew the two tubing nuts which secure the air lines to the cleaner.

d. Remove the two hex nuts and washers which secure the U-bolt holding the air cleaner; remove the air cleaner.

5-69. AIR CLEANER INSTALLATION. Install the air cleaner in the following manner:

a. Position the air cleaner in place on its mounting bracket with the arrow on the filter body pointing toward the rear of the van.

b. Secure the air cleaner in position with the U-bolt, two nuts, and washers.

c. Attach the two air lines to the cleaner using the two tube nuts.

d. Close air reservoir drain cock and open shutoff cocks on tractor air lines.

e. Check all connections for tightness before using the van brakes.

5-70. AIR RESERVOIR REMOVAL. Remove the air reservoir in the following manner:

**WARNING**

Insure that wheel chocking blocks are in place to prevent movement of the van before releasing brakes.

a. Close the shutoff cocks on the air lines of the tractor.

b. Relieve the air pressure in the brake system by opening the drain cock on the air reservoir.

c. Remove the 3/8-inch air line to the air reservoir.

d. Remove the two long bolts from the bottom of the clamp on the air reservoir.

e. Remove the air reservoir by pulling it down to spread the clamps.

5-71. AIR RESERVOIR INSTALLATION. Install the air reservoir in the following manner:

a. Spread clamps and insert air reservoir in position with the 3/8-inch tubing connection of the curbside of the van.

b. Insert and tighten the two long bolts securely in the clamp. Check that the air chamber is securely mounted.

c. Connect the 3/8-inch air line to the air reservoir.

d. Close the drain cock on the air reservoir and open the shutoff cocks on the tractor.

e. Check all connections for tightness before using the van brakes.



**5-72. REPLACEMENT OF AIR LINES AND COUPLINGS.** Replace air lines and/or couplings in the following manner:

**WARNING**

Insure that wheel chocking blocks are in place to prevent movement of the van before releasing brakes.

a. Close the shutoff cocks on the air lines of the tractor.

b. Relieve the air pressure in the brake system by opening the air reservoir.

c. Unscrew and replace air lines and/or couplings as required. Coat all pipe threads with pipe sealing compound before installation.

d. Close the drain cock on the air reservoir and open the shutoff cocks on the tractor.

e. Check all connections for tightness before using the van brakes.

**5-73. LANDING GEAR.**

**5-74. REMOVAL AND INSTALLATION OF LANDING GEAR.** Refer to paragraph 2-87 for landing gear removal. Installation is the reverse of this procedure.

**5-75. RATCHET CRANK ASSEMBLY.** Inspect and repair the ratchet crank assembly in the following manner:

a. Drill out the plug and remove the spring and ball.

b. Remove the pawl lever, and lift off the cover plate after three cover plate screws have been removed.

c. Remove the ratchet, pawl and pin assembly.

d. Mark the position of the pawl on pawl pin and drive out the pawl pin.

e. Remove crank handle, if necessary, by filing or grinding off peened end of the long rivet.

**WARNING**

Prolonged contact with dry cleaning solvent or inhalation of fumes is dangerous; provide adequate ventilation.

f. Clean all parts with dry cleaning solvent, Fed Spec O-T-620a.

g. Inspect all parts for wear or damage and replace as necessary.

h. Install the crank handle by inserting a new rivet and peening both ends.

i. Press the pawl pin into the pawl to the mark you made when disassembling it.

j. Insert the pawl and pawl pin into the hole in the handcrank body.

k. Install the ratchet, gear end first.

l. Install the cover plate and secure it with the three screws removed in step b. Install the pawl lever.

m. Insert the ball, spring, and plug in the original hole; stake the plug in place.

n. Lubricate the handcrank through the grease fitting on the handcrank body using bearing grease MIL-G-3278.

**5-76. GEAR BOX ASSEMBLY.** Inspect and repair the gear box assembly in the following manner:

a. Remove the gear box cover and gasket by removing the four attaching screws and lockwashers.

b. Drive out the two pins on the bevel gear shaft and the one pin on the crank shaft.

c. Drive out the bevel gear shaft and pull out crankshaft; remove gear sets.

d. Remove the locknut, and lift off the bevel gear, key, and bearing cone.

**WARNING**

Prolonged contact with dry cleaning solvent or inhalation of fumes is dangerous; provide adequate ventilation.

e. Clean all parts with dry cleaning solvent, Fed Spec. O-T-620a.

f. Inspect all parts for damage or excessive wear; replace if necessary.

g. Install the bearing cone, key, and large bevel gear; secure with a locknut.

h. Position the small bevel gear, washer, and rigid gear set in gear box, and slide the bevel gear shaft and woodruff key into position.

i. Drive the two bevel shaft pins into place.

j. Position the sliding gear set, and slide the crankshaft into place; attach sliding gear set to the crankshaft with the pin.

k. Place the detent ball and spring in the hole; attach the gasket and gear box cover with the four screws and lockwashers.

l. Lubricate the gear box through the grease fitting on the box using bearing grease, MIL-G-3278.

**5-77. SCREW AND LOWER LEG ASSEMBLY.**  
After disassembling the gear box, inspect and repair the screw and lower leg assembly in the following manner:

a. Remove the machine screw, spring, and key securing the upper end of the leg assembly.

b. Pull the extension screw and lower leg assembly from the bottom of the upper leg casting.

c. Slide the thrust bearing from the extension screw.

d. Remove the extension screw from the lower leg assembly by temporarily sliding the large bevel gear and key over the end of extension screw and then turning the bevel gear.

e. Push in the two pins, and remove the elevating nut from the lower leg.

### WARNING

Prolonged contact with dry cleaning solvent or inhalation of fumes is dangerous; provide adequate ventilation.

f. Clean all parts with dry cleaning solvent, Fed Spec O-T-620a.

g. Inspect all parts for damage or excessive wear; replace parts as necessary.

h. Insert the elevation nut in the end of the lower leg and attach it with the elevating nut retaining pins. The elevating nut retaining pins must be inserted from the inside of the elevating nut.

i. Thread the bottom of extension screw into the elevating nut.

j. Install the thrust bearing on the upper end of the extension screw and slide the extension screw and lower leg assembly into the upper leg.

k. Rotate the lower leg assembly so that the keyway is aligned with the keyhole, and insert the machine key, spring, and screw.

l. Lubricate the grease fitting on the lower leg, using grease, MIL-G-10924.

## SECTION III

### SPECIAL MAINTENANCE

#### 5-78. GENERAL.

5-79 This section provides data for the performance of maintenance not normally accomplished at the organizational/field level. The data in this section is limited to and grouped according to mechanical assemblies of the van. Refer to the applicable assembly drawing in TM 11-5820-762-25P when performing the removal, installation, and disassembly procedures contained in this section.

#### 5-80. REFINISHING OF BRAKEDRUMS.

5-81. To refinish brakedrums proceed as follows:

a. Inspect the brakedrum for warpage cracks, or scored braking surface; replace if necessary.

b. Check the brakedrum for runout; if runout exceeds the specified limit (table 5-4), or the surface is scored, refinish the surface of the brakedrum. If refinishing the brakedrum required the removal of more than 1/16 inch of metal (1/8 inch on diameter) replace the brakedrum. Both the runout check and refinishing of the drum may be performed on a lathe.

c. Install the brakedrum on the hub (para 5-43).

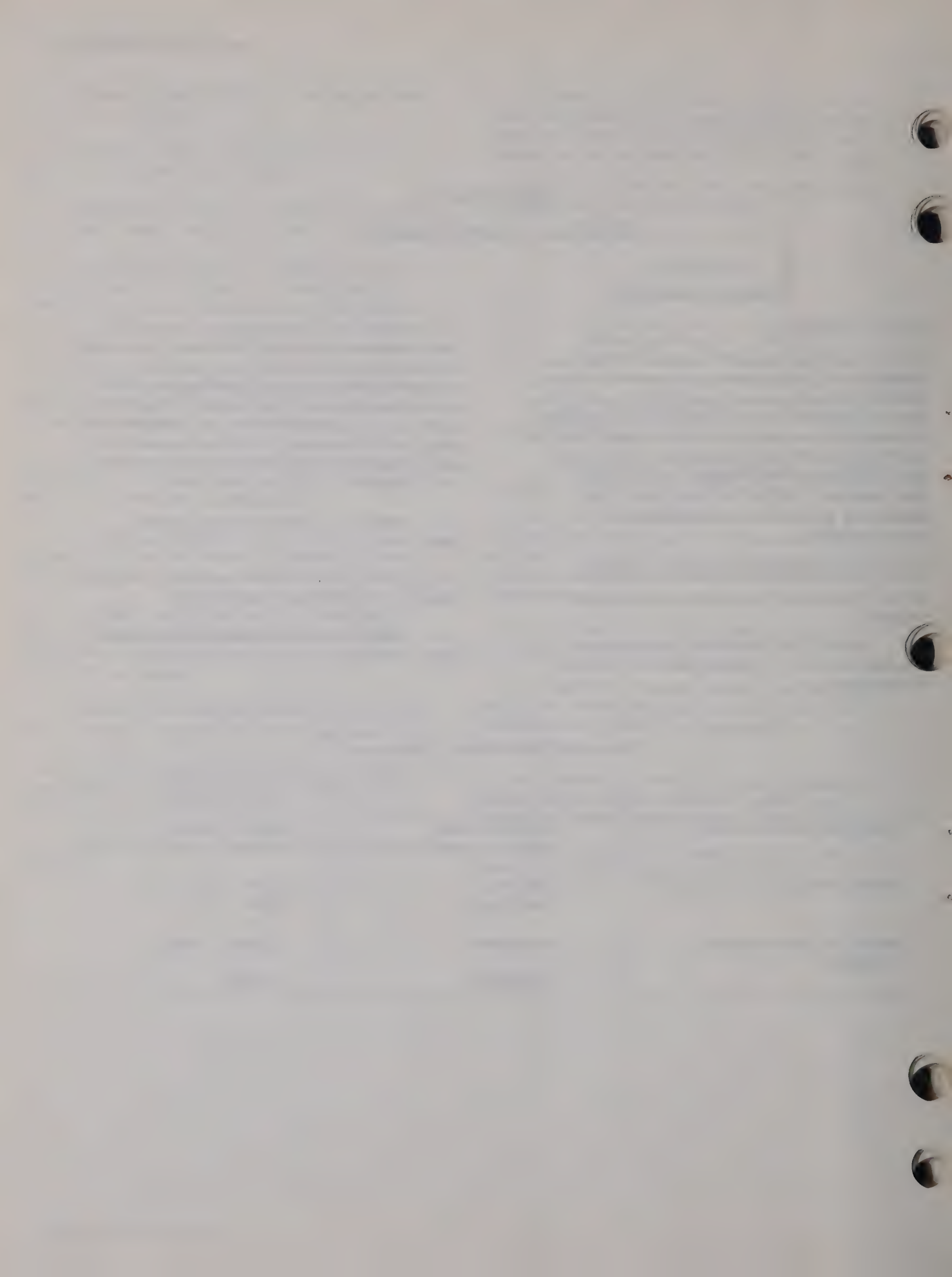
d. Lubricate the inside surface of the hub, spindle, and bearings (para 5-40).

e. Install hub and brakedrum on to axle (para 5-41).

Table 5-4. Mechanical Tolerance

Item	Part	Tolerance (in.)
Brakedrum inside diameter	New brake drum	16.500 - 16.510
	Wear and runout limit	16.625
Radius rod bore inside diameter	New bore	1.252 - 1.254
	Wear limit	1.256
Radius rod spindle outside diameter	New spindle	1.2515 - 1.2485
	Wear limit	1.24465





## **CHAPTER 6**

### **CIRCUIT DIAGRAMS**

#### 6-1. PURPOSE.

6-2. This chapter illustrates by schematic wiring diagrams and cabling diagrams all power wiring, interconnecting cabling and component circuits of the power amplifier van. Diagrams for the 10-kw power amplifier, parametric amplifier, frequency converter, dummy load, dehydrator, and heat exchanger are covered in separate manuals which are listed in Appendix A to this manual.

#### 6-3. SCOPE.

6-4. This chapter contains all circuit diagrams for the power amplifier van and interior equipment except for those units for which separate manuals are provided.

#### 6-5. ARRANGEMENT OF DIAGRAMS.

6-6. Diagrams are arranged so that the first five figures are schematic wiring diagrams. These are followed by two cabling diagrams which complete the set of diagrams. When differences in configurations exist, diagrams are marked accordingly. Figures 6-8 through 6-25 are parts location diagrams keyed to Appendix B.

#### 6-7. CIRCUIT DIAGRAM REFERENCE DATA.

6-8. All graphic electrical and electronic symbols conform to MIL-STD-15A and all abbreviations used in this chapter conform to MIL-STD-12A. Reference designations conform to MIL-STD-16.

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1. The purpose of this document is to provide a comprehensive overview of the current state of the project and to outline the key findings and recommendations.

2. The project has been conducted in accordance with the established protocols and procedures, and the results have been carefully reviewed and analyzed.

3. The findings indicate that the project has achieved its primary objectives, and the data suggests a positive trend in the overall performance.

4. However, there are several areas that require further attention and improvement, particularly in the areas of communication and coordination.

5. The recommendations provided herein are intended to address these issues and to ensure the successful completion of the project in the future.



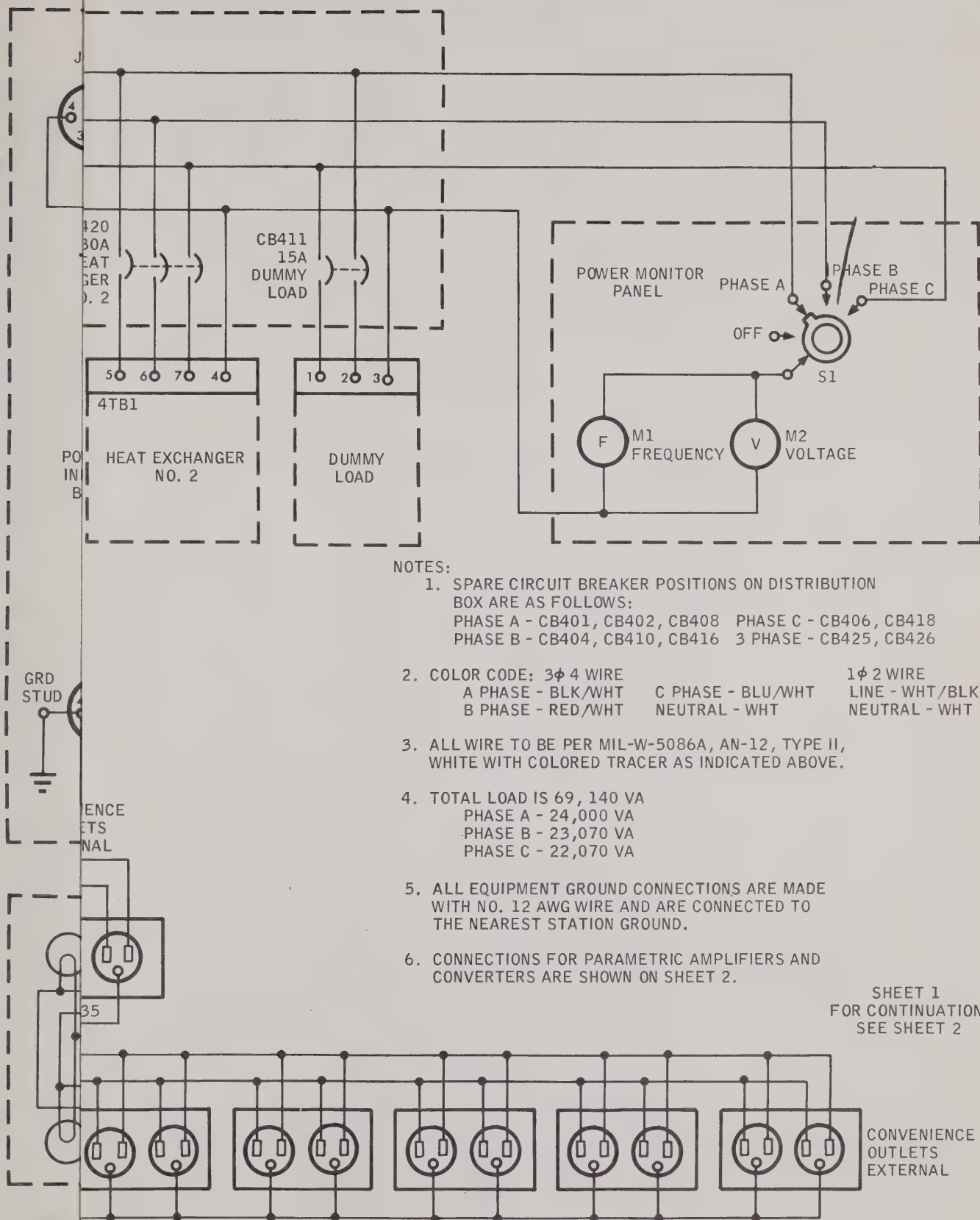


Figure 6-1. AC Power Distribution System, Configuration A,  
Wiring Diagram (Sheet 1 of 2)

# THE HISTORY OF THE CITY OF BOSTON

The history of the city of Boston is a subject of great interest and importance. It is a city of many centuries, and its history is full of interesting events and incidents. The city was founded in 1630, and since that time it has grown to be one of the largest and most important cities in the United States. Its history is full of many interesting events and incidents, and it is a city that has played a great part in the history of the United States.

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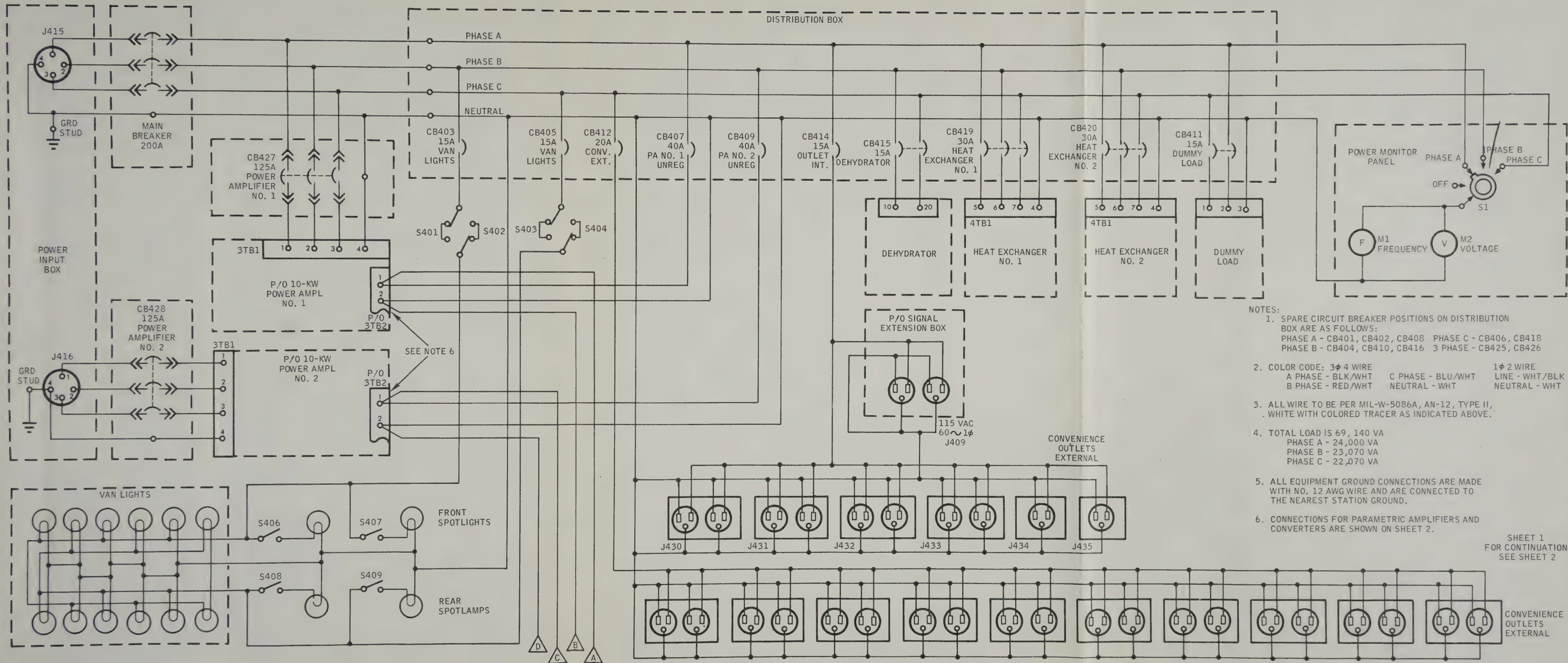


Figure 6-1. AC Power Distribution System, Configuration A, Wiring Diagram (Sheet 1 of 2)



SHEET 2  
FOR CONTINUATION  
SEE SHEET 1

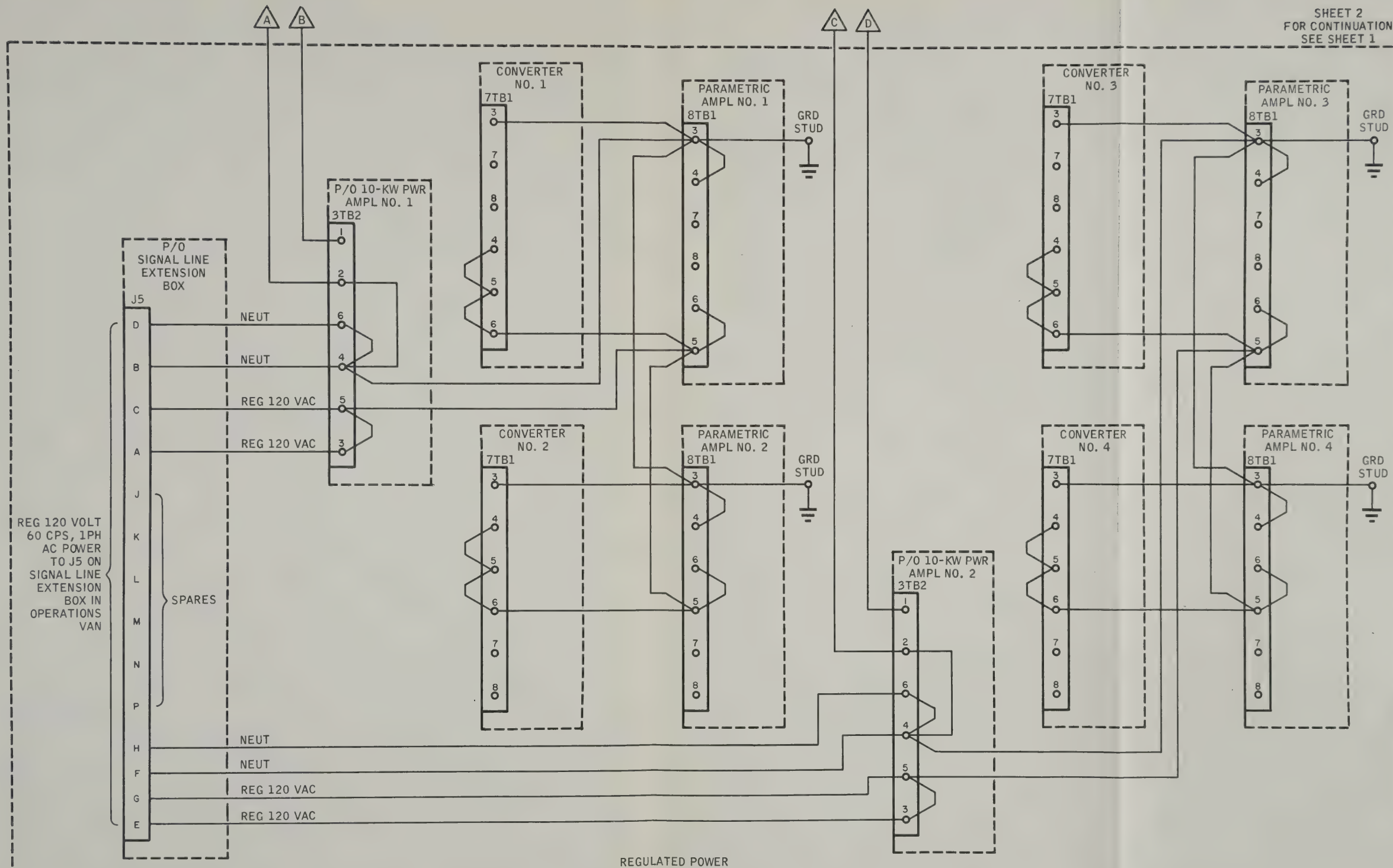
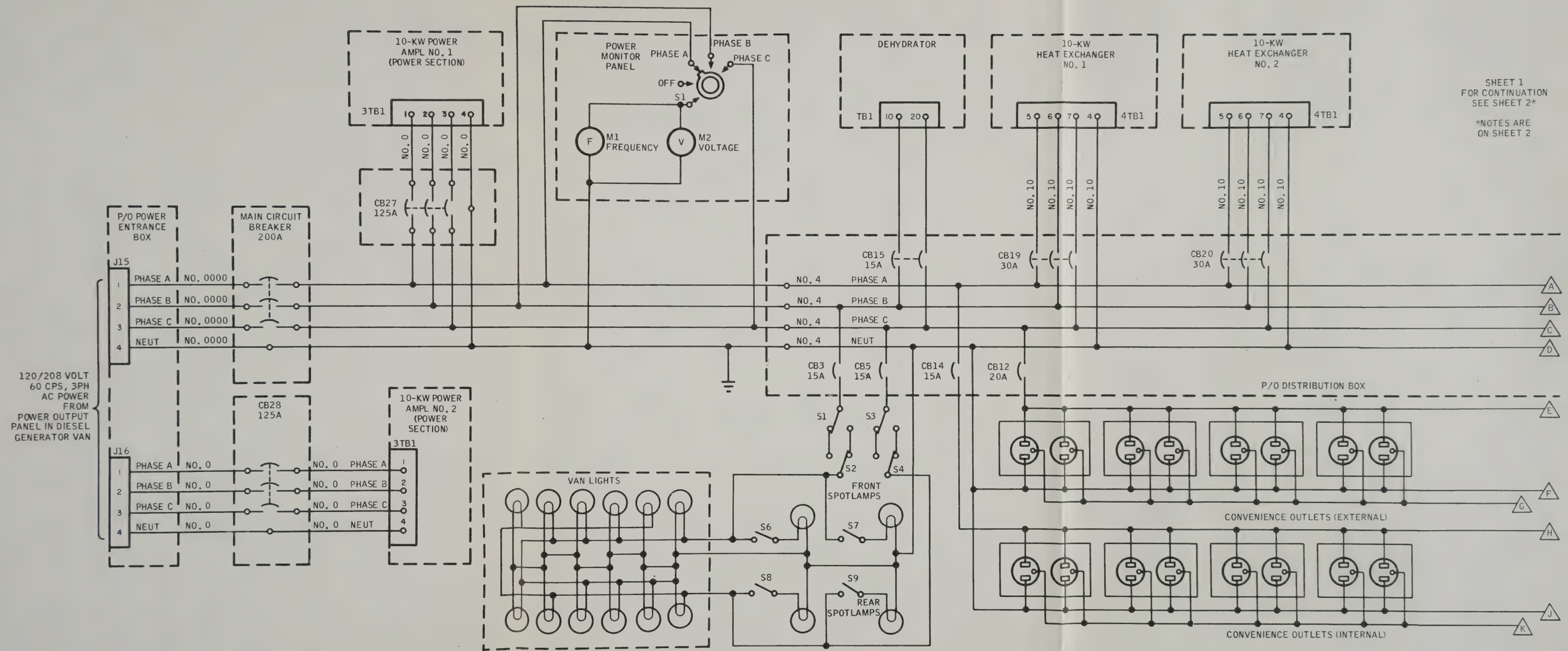


Figure 6-1. AC Power Distribution System,  
Configuration A, Wiring  
Diagram (Sheet 2 of 2)

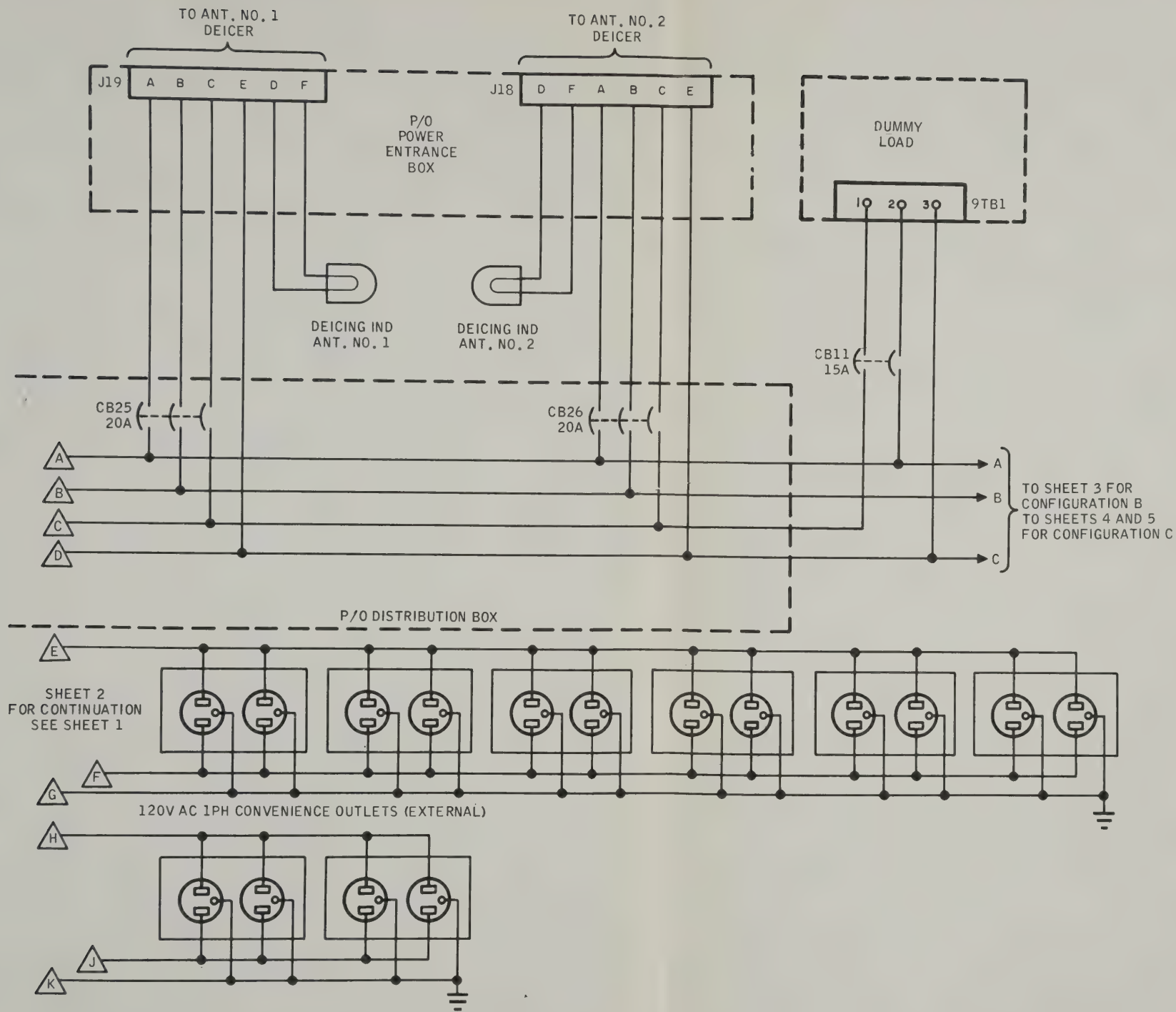


SHEET 1  
FOR CONTINUATION  
SEE SHEET 2\*

\*NOTES ARE  
ON SHEET 2

Figure 6-2. AC Power Distribution System, Configurations B and C,  
Schematic Wiring Diagram (Sheet 1 of 5)





- NOTES:
1. SHEET 3 SHOWS THE SPECIAL WIRING FOR CONFIGURATION B; SHEETS 4 AND 5 SHOWS THE SPECIAL WIRING FOR CONFIGURATION C.
  2. ALL WIRE IS AN12, TYPE II, UNLESS OTHERWISE INDICATED.
  3. WIRE COLORS ARE AS SHOWN BELOW UNLESS OTHERWISE INDICATED.

WIRE	COLOR
PHASE A	WHT/BLK
PHASE B	WHT/RED
PHASE C	WHT/BLU
REG 120V AC	WHT/BLK
NEUT	WHT
GRD	WHT/GRN
REG 120V AC (B+PRI)	RED
REG 120V AC (FIL)	BLK

4. CIRCUIT BREAKERS WITH SPARE POSITIONS ARE INDICATED BELOW.

CIRCUIT BREAKER	SPARE POSITION
CB1, CB2	PHASE A
CB4, CB16	PHASE B
CB6, CB18	PHASE C

5. CIRCUIT BREAKERS CB8 AND CB10 ARE NOT USED IN CONFIGURATION B.
6. VAN SERIES 400.
7. ALL EQUIPMENT GROUND CONNECTIONS ARE MADE WITH NO. 12 AWG WIRE AND CONNECTED TO THE NEAREST STATION GROUND.

Figure 6-2. AC Power Distribution System, Configurations B and C, Schematic Wiring Diagrams (Sheet 2 of 5)



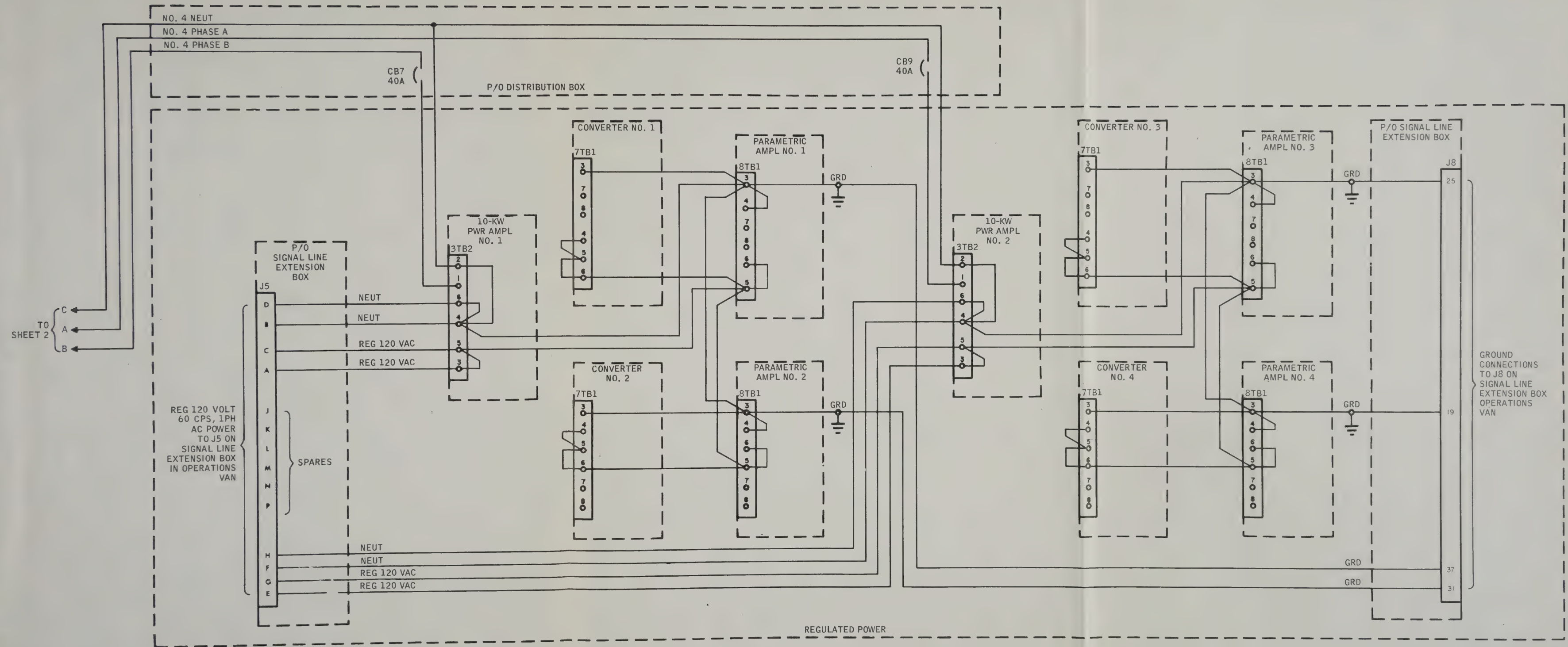
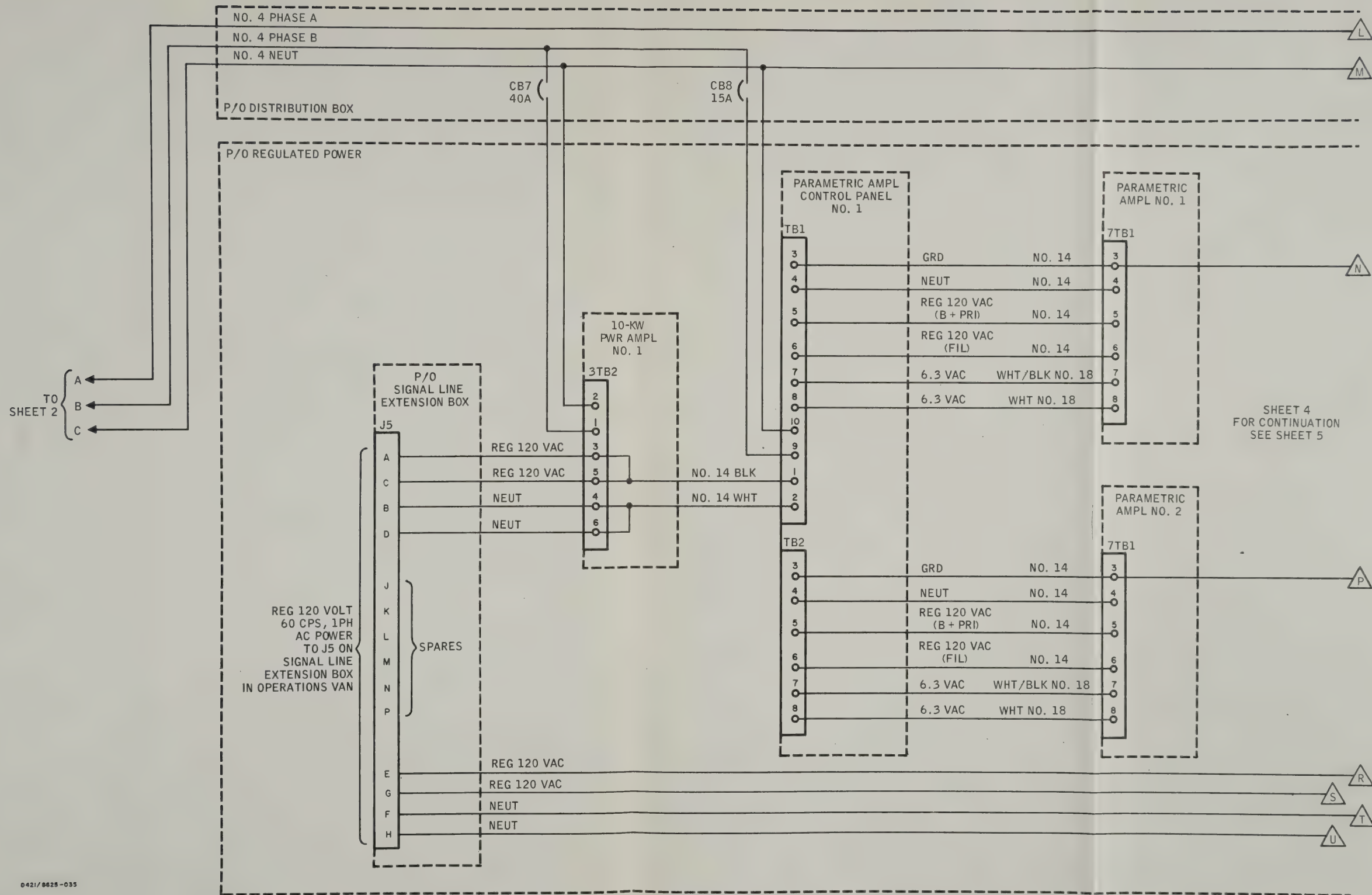


Figure 6-2. AC Power Distribution System, Configurations B and C, Schematic Wiring Diagram Sheet 3 of 5)



0421/8425-035

Figure 6-2. AC Power Distribution System, Configurations B and C, Schematic Wiring Diagram (Sheet 4 of 5)

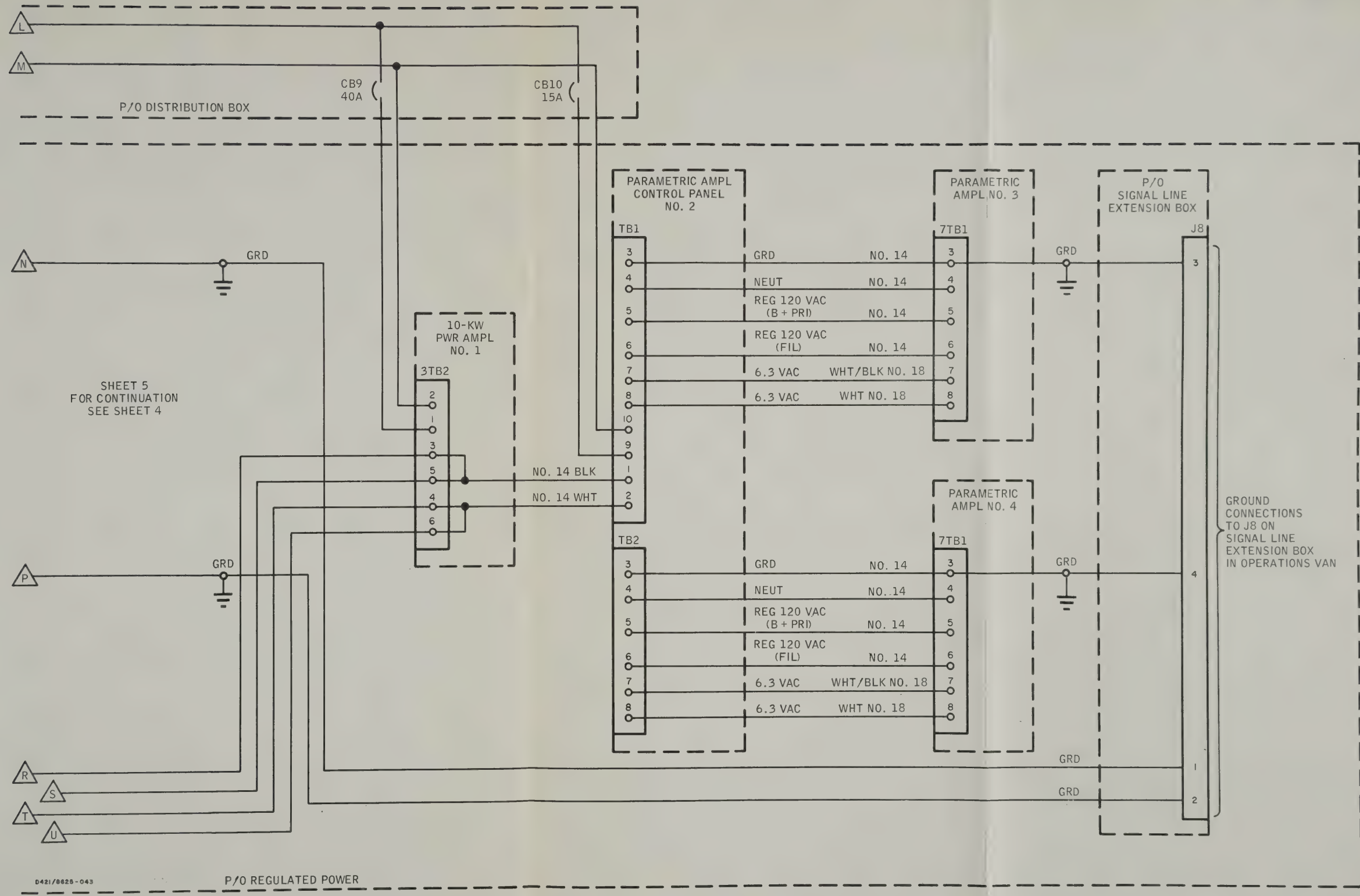
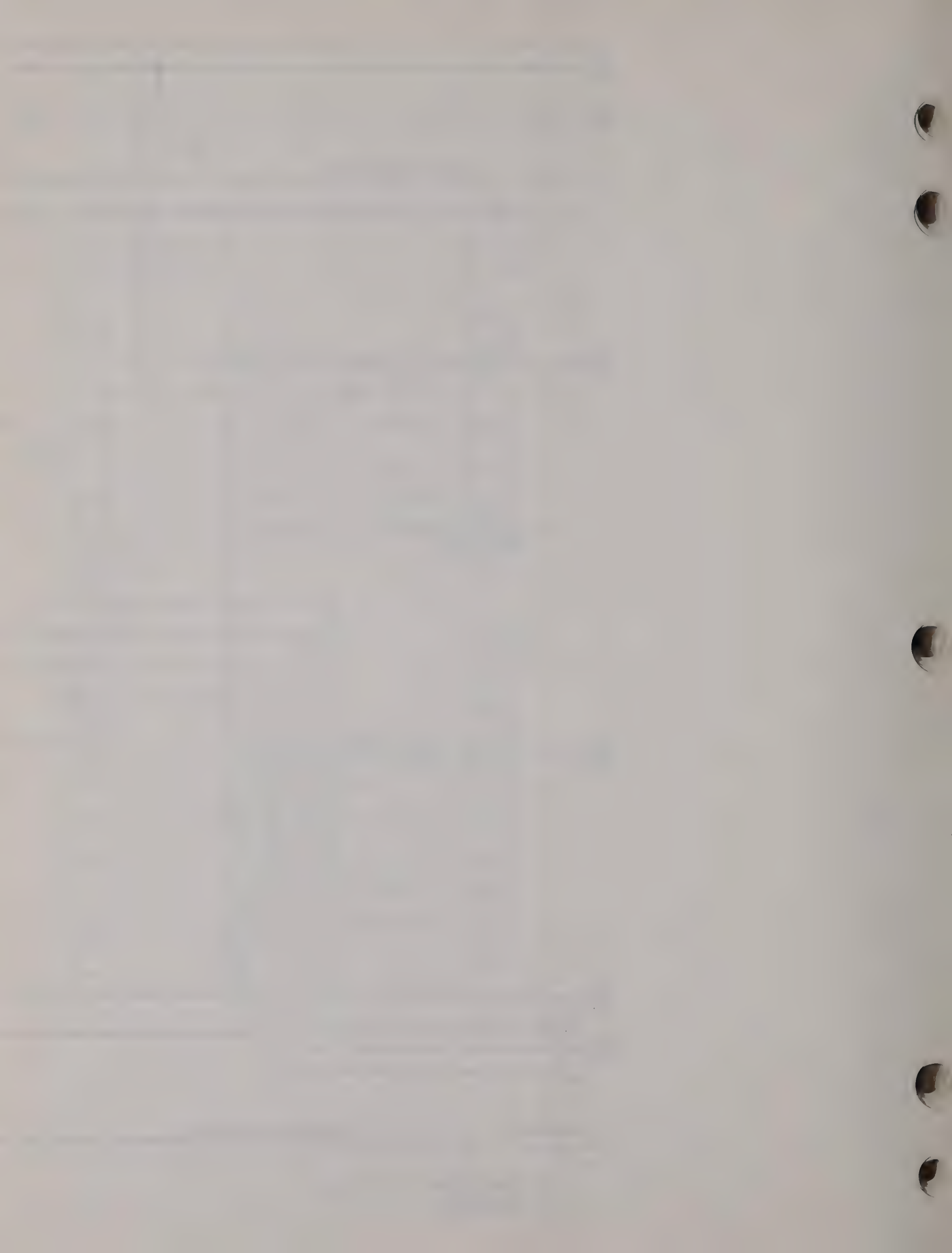


Figure 6-2. AC Power Distribution System, Configurations B and C, Schematic Wiring Diagram (Sheet 5 of 5)





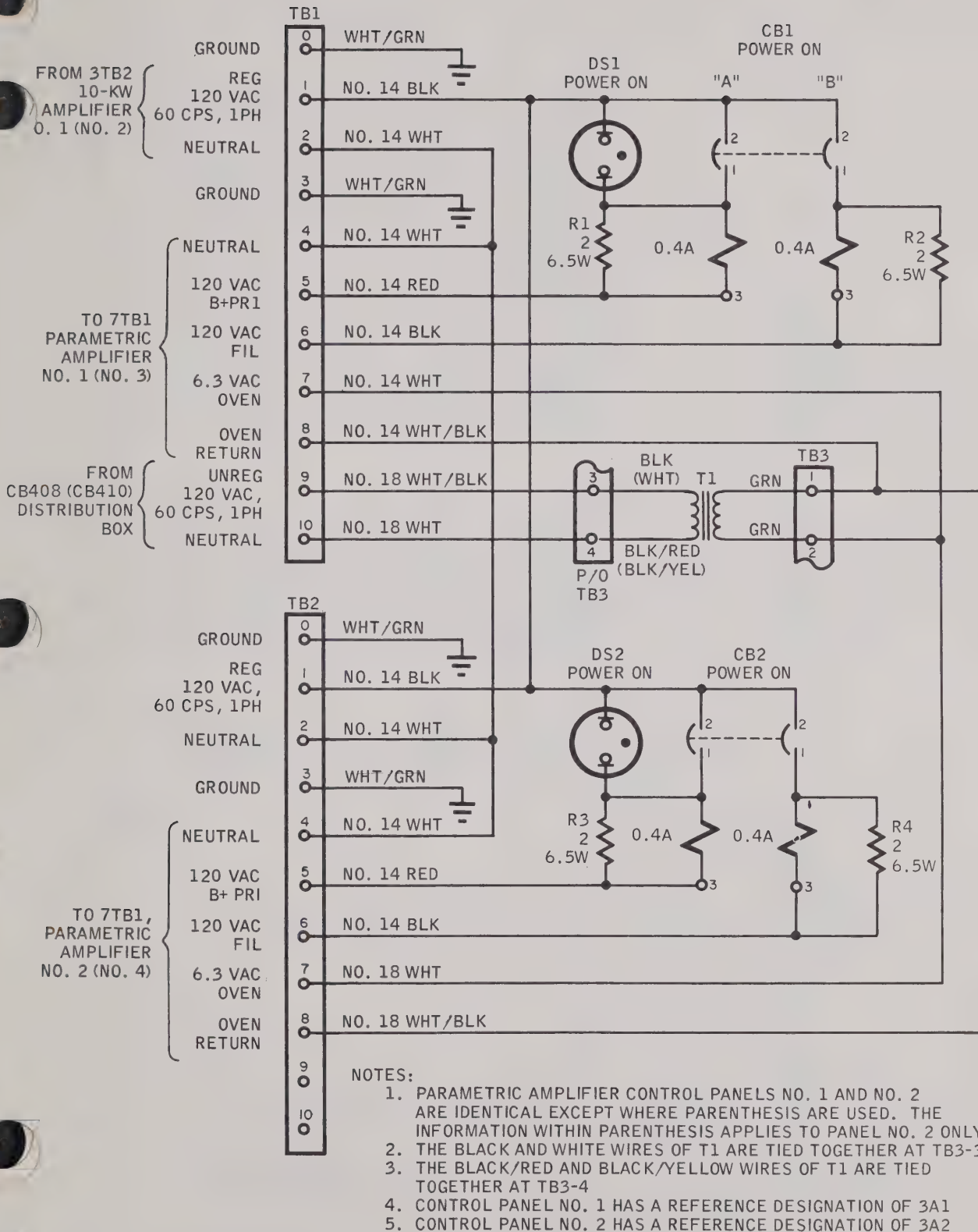


Figure 6-3. Parametric Amplifier Power Control Panels No. 1 and No. 2, Configuration C, Schematic Wiring Diagram





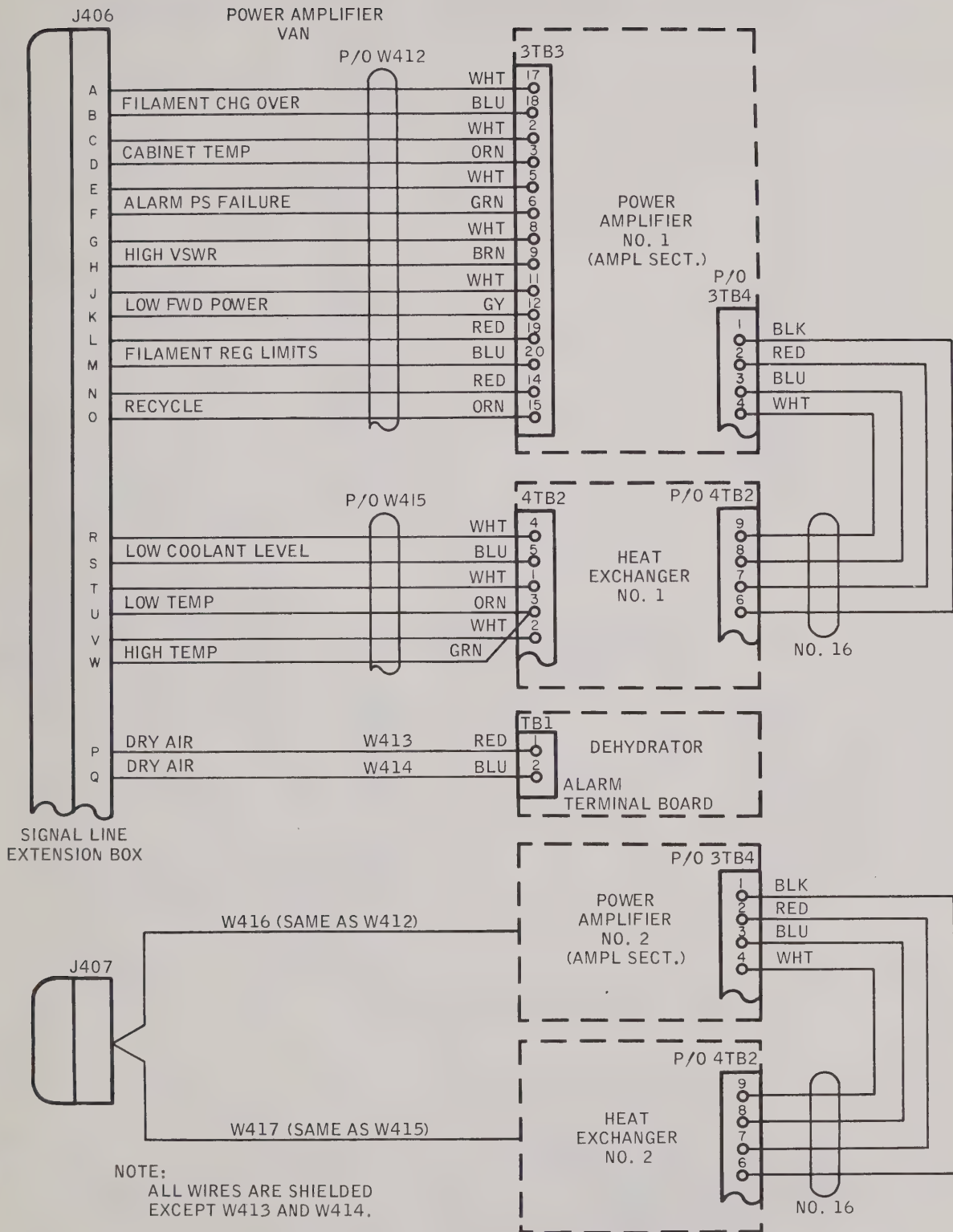
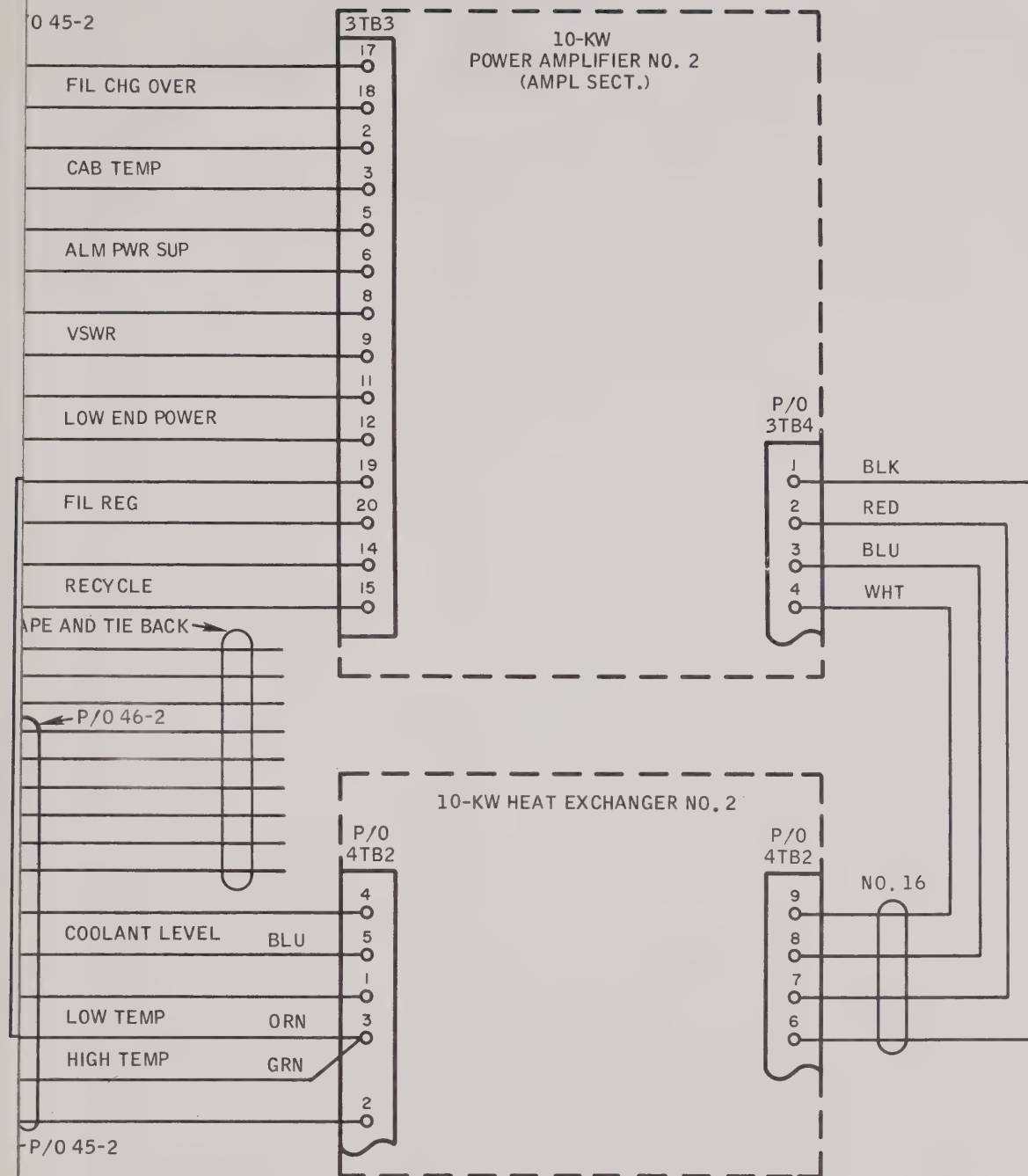


Figure 6-4. Fault Indicator and Alarm Circuits, Configuration A, Schematic Wiring Diagram





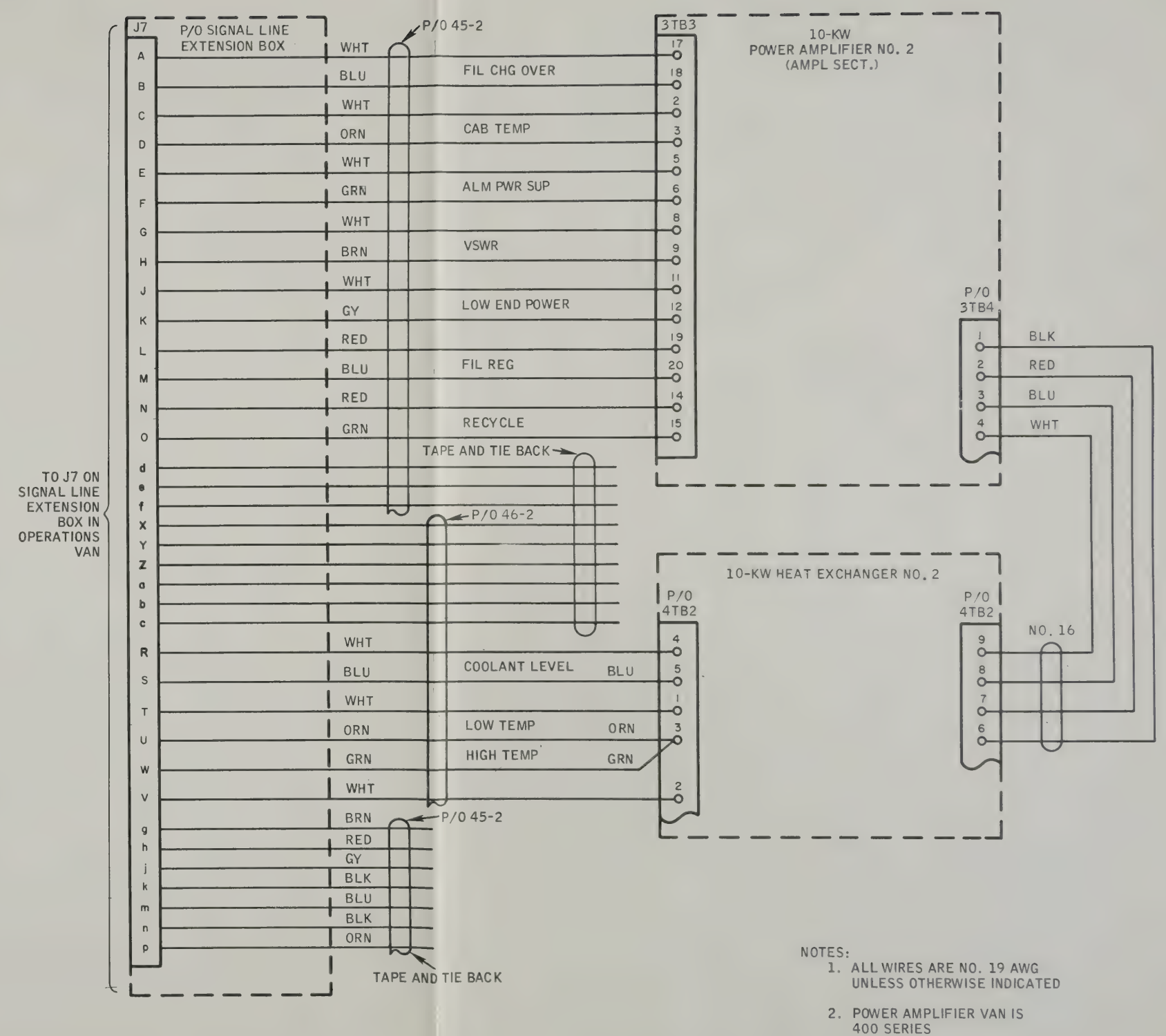
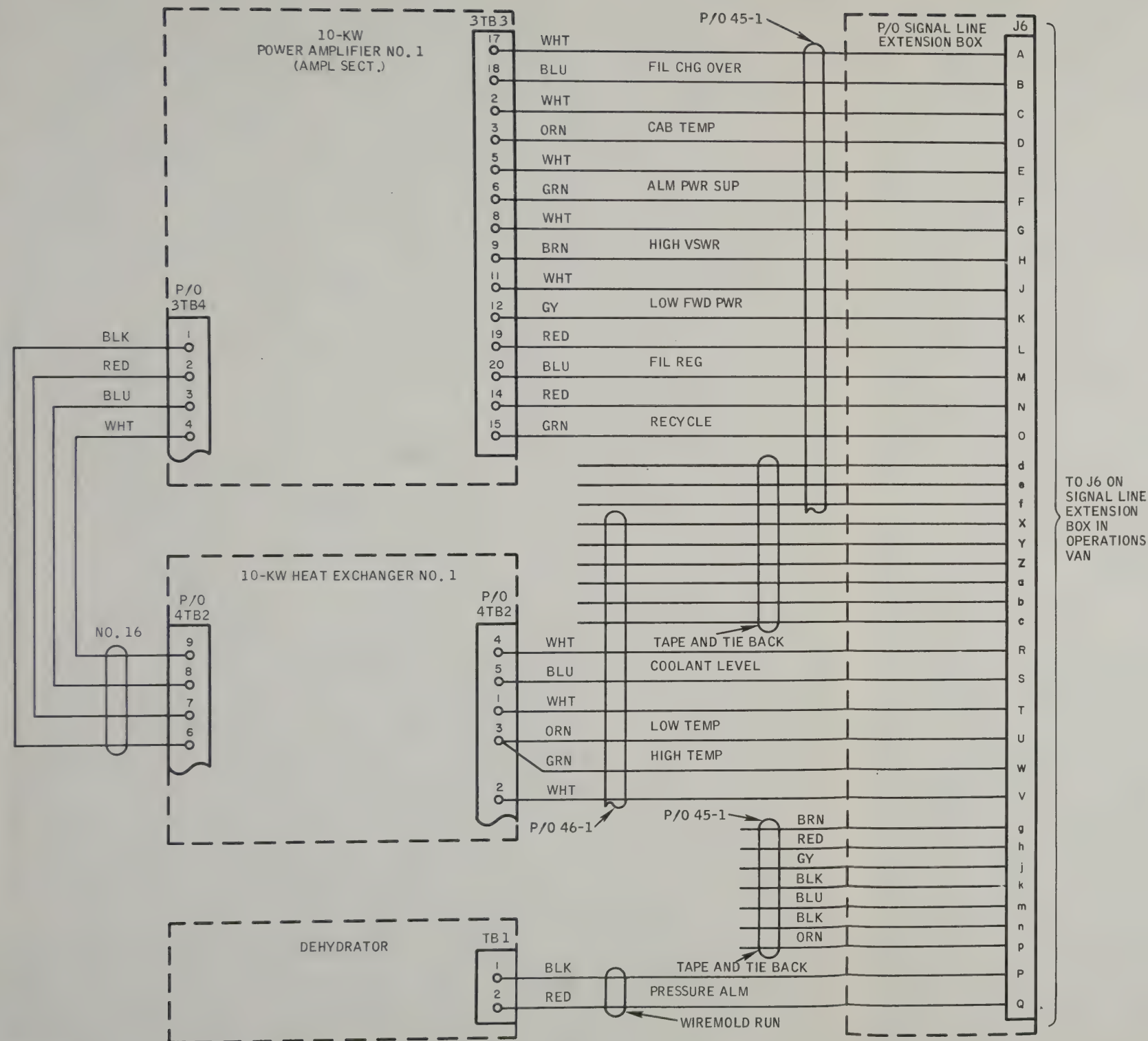
## NOTES:

1. ALL WIRES ARE NO. 19 AWG  
UNLESS OTHERWISE INDICATED
2. POWER AMPLIFIER VAN IS  
400 SERIES

Figure 6-5. Fault Indicator and Alarm Circuits,  
Configurations B and C, Schematic  
Wiring Diagram







- NOTES:
1. ALL WIRES ARE NO. 19 AWG UNLESS OTHERWISE INDICATED
  2. POWER AMPLIFIER VAN IS 400 SERIES

Figure 6-5. Fault Indicator and Alarm Circuits, Configurations B and C, Schematic Wiring Diagram

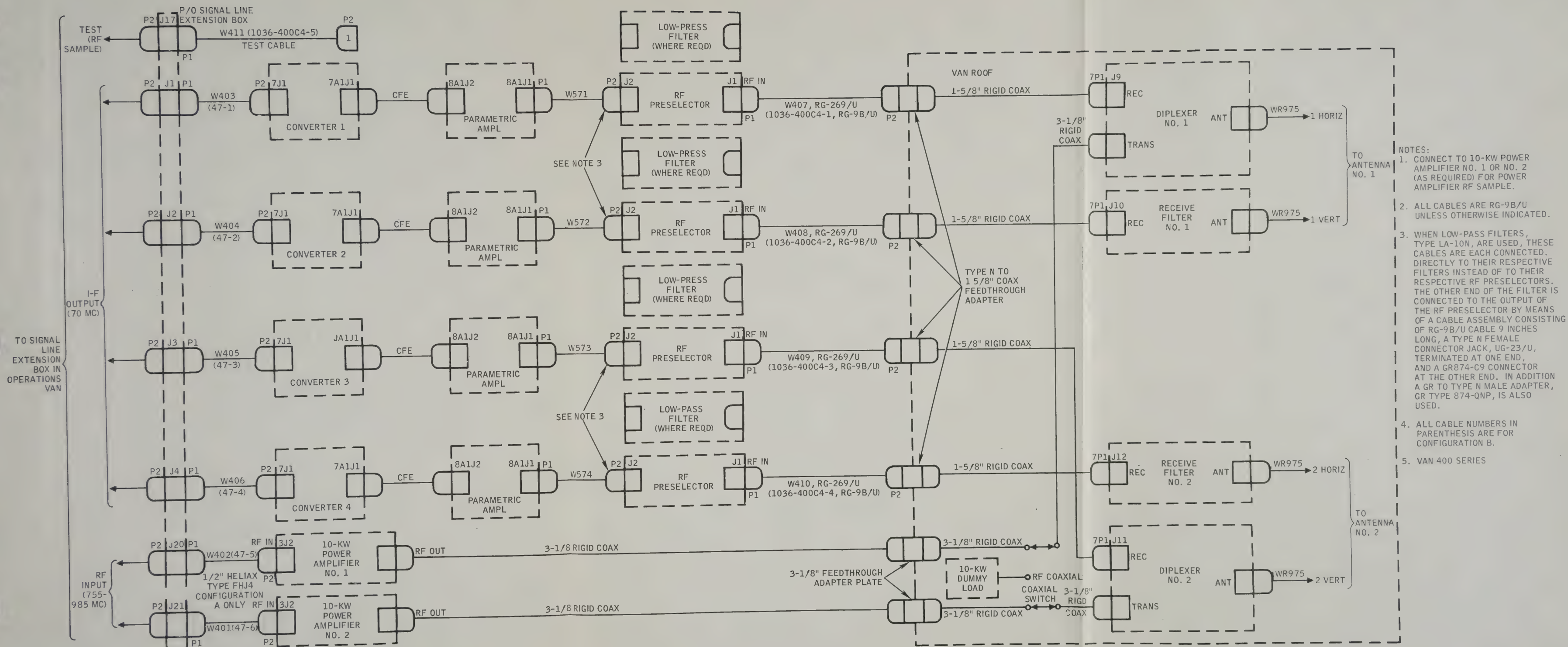


Figure 6-6. RF Cabling Diagram, Configurations A and B



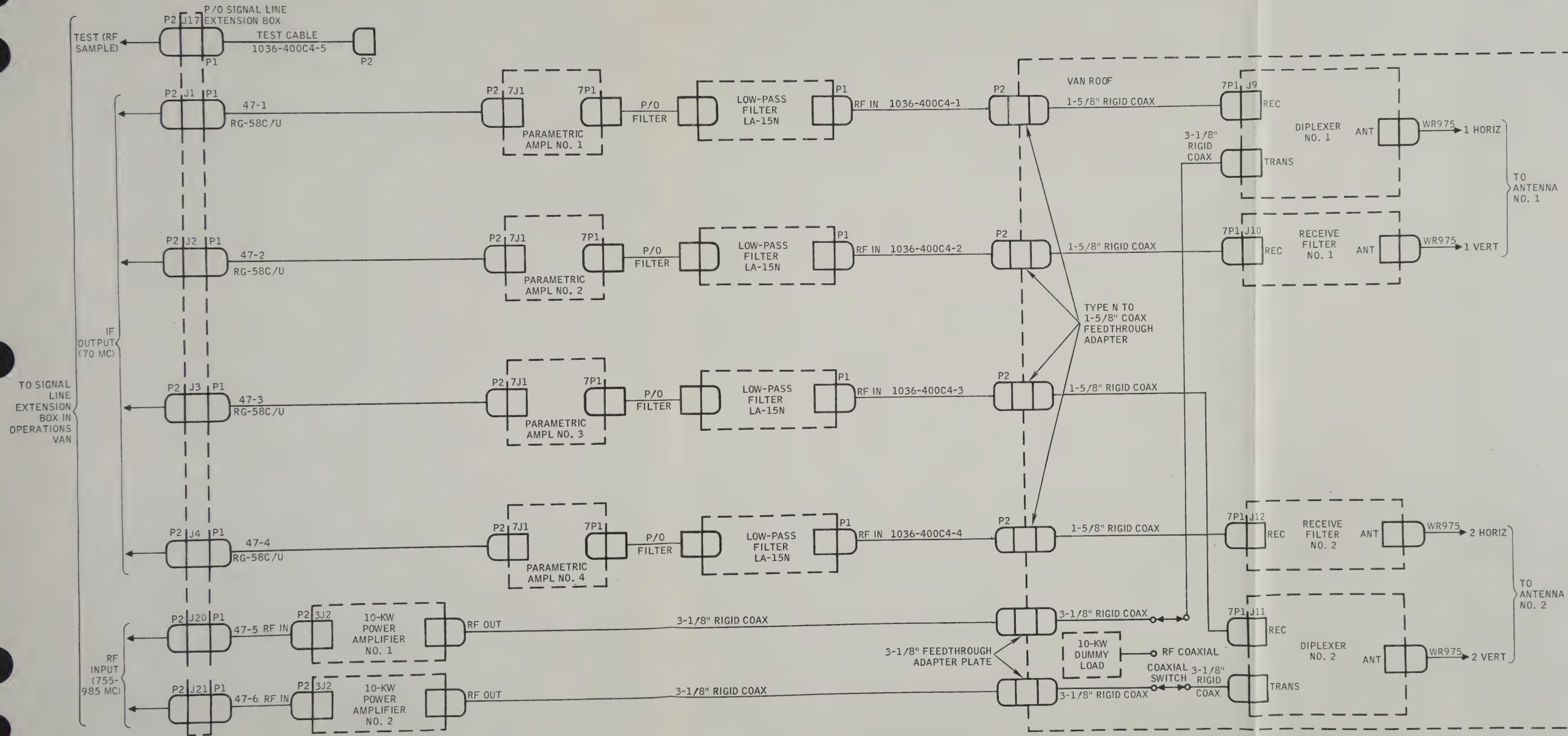
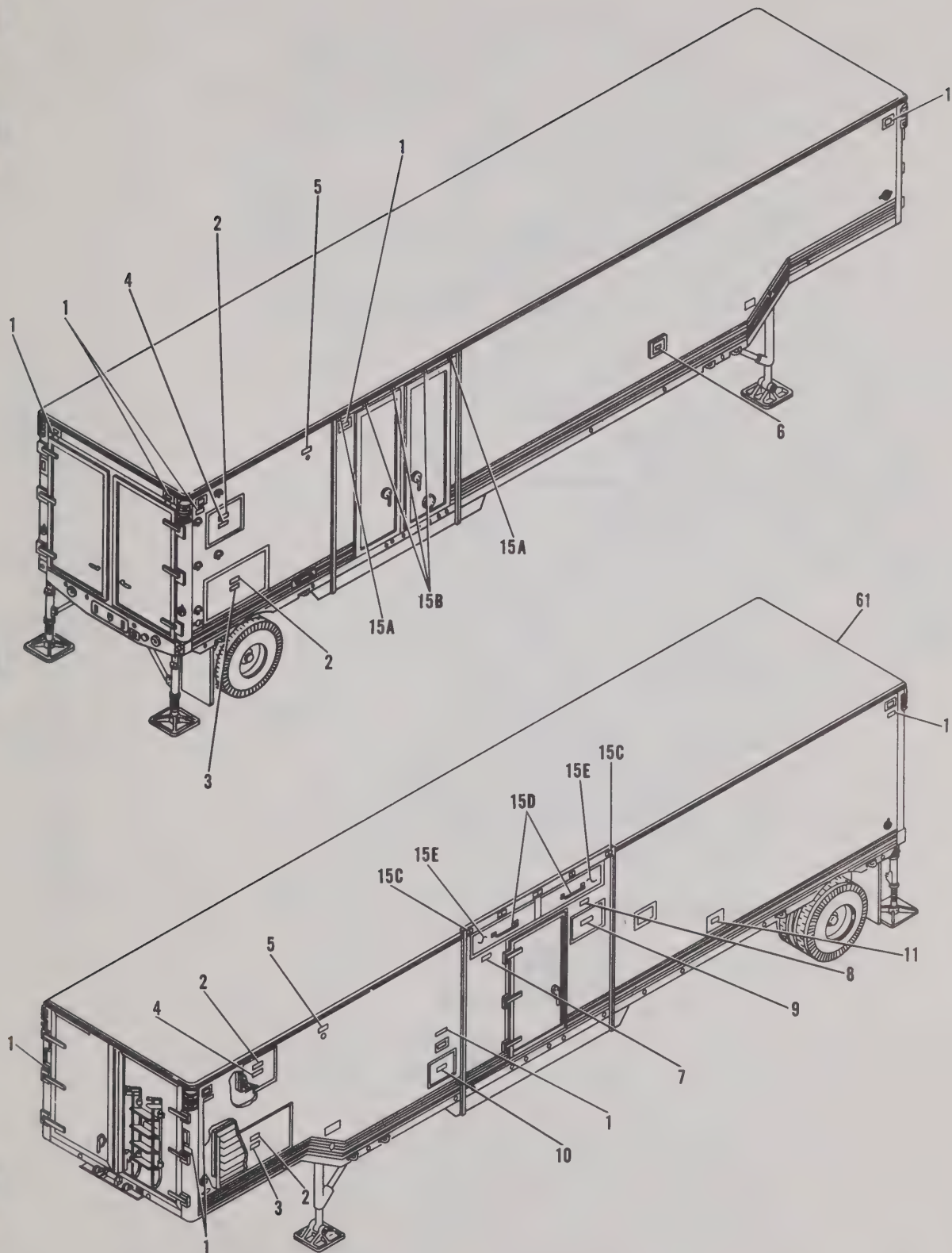


Figure 6-7. RF Cabling Diagram, Configuration C





K421/8625-101

FIGURE 6-8. Radio Set Group (Sheet 1 of 2)



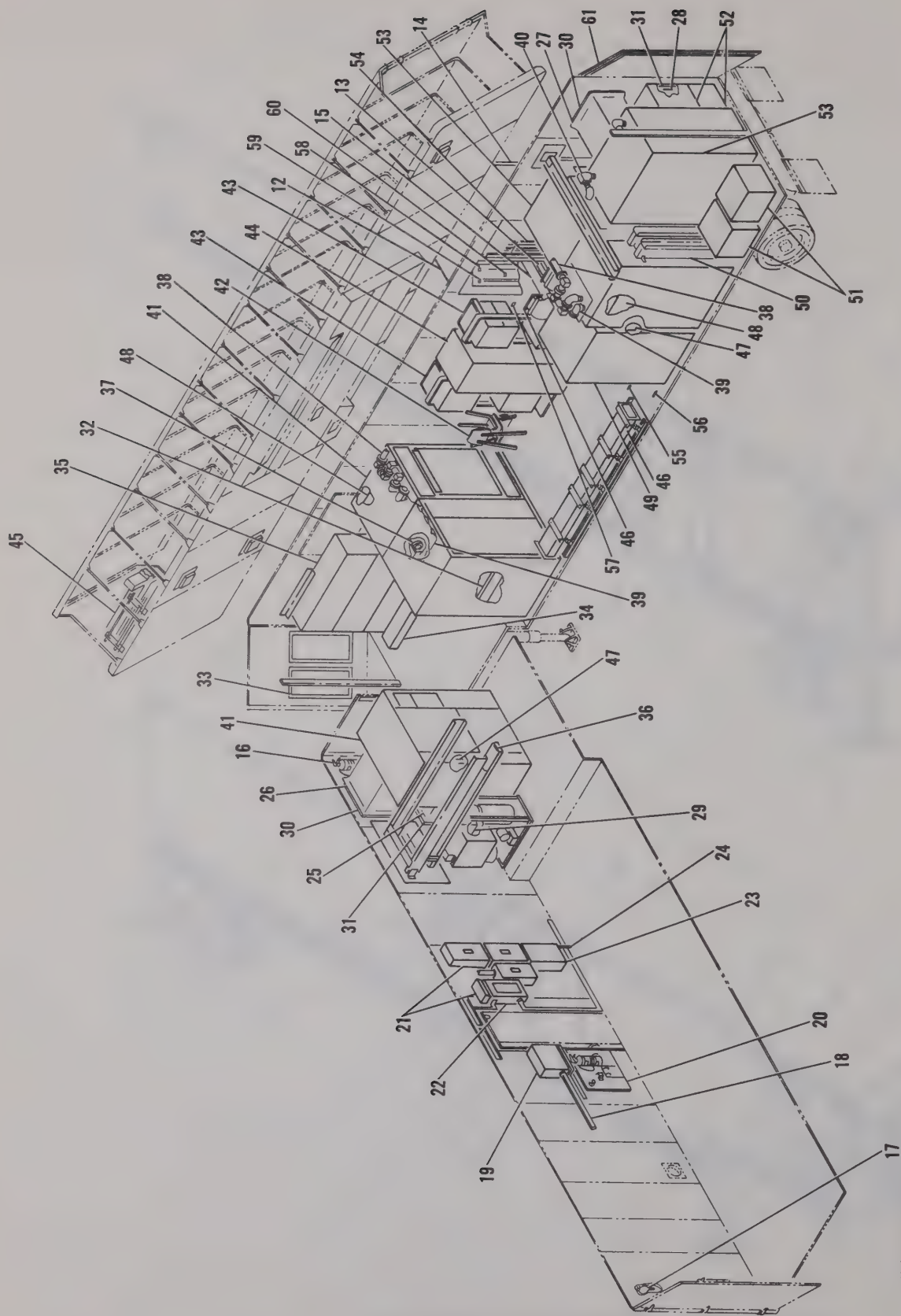
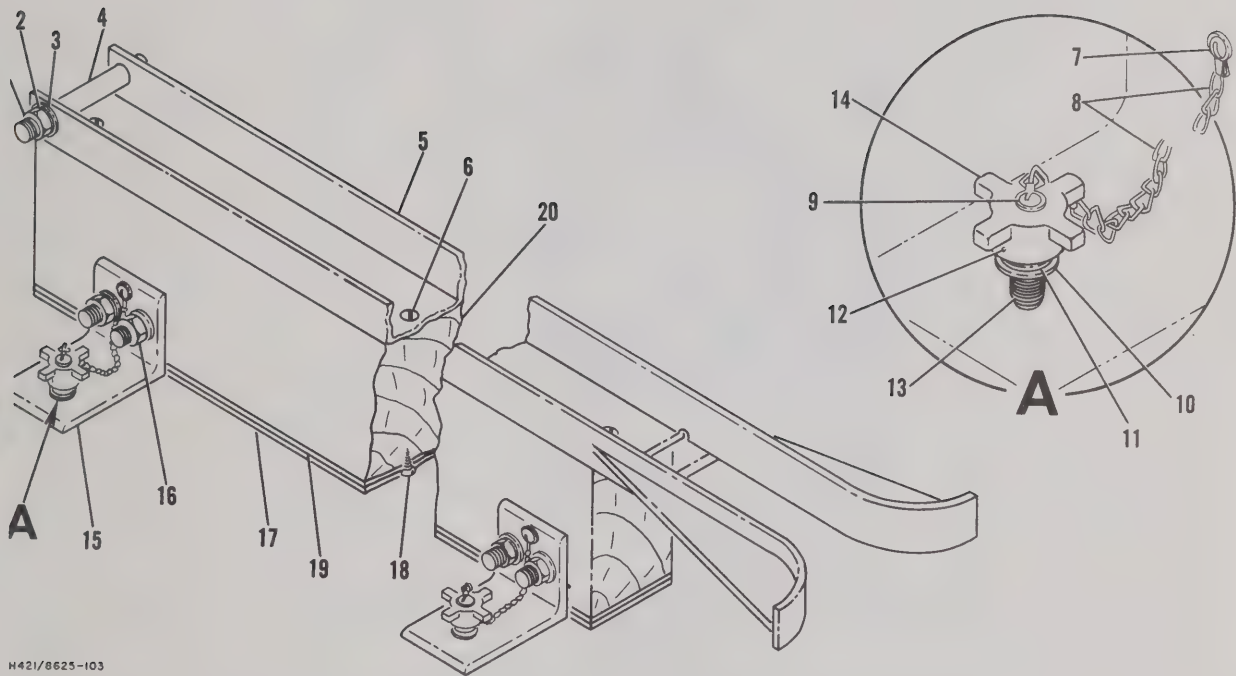


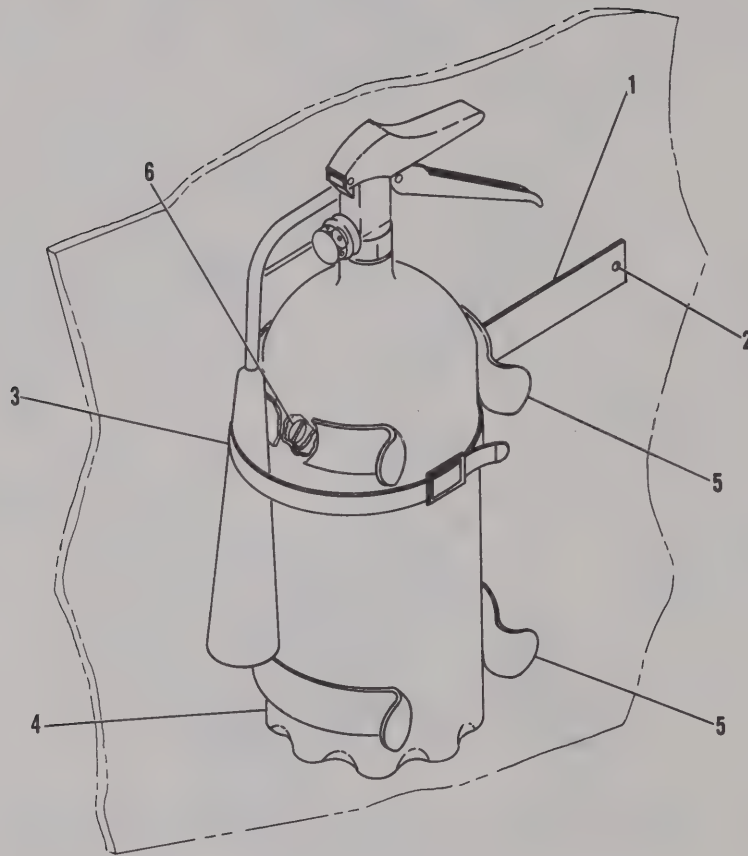
FIGURE 6-8 Radio Set Group (Sheet 2 of 2)

K 43/8625-102



H421/8625-103

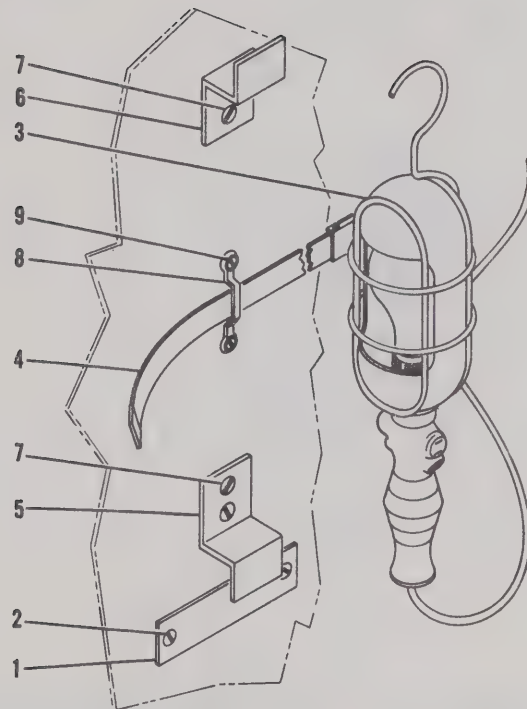
FIGURE 6-9. Installation of Radio Frequency Amplifier-Dolly Track



J 421/8625-106

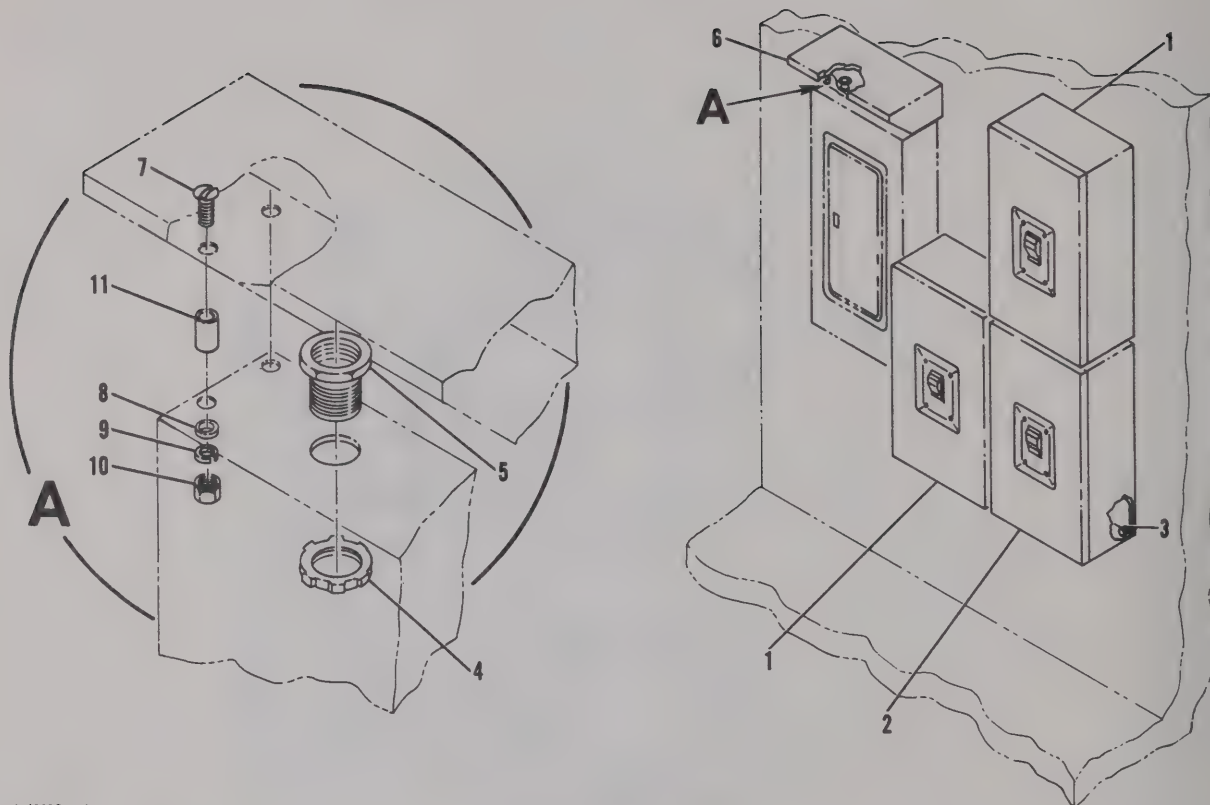
FIGURE 6-10. Installation of Fire Extinguisher





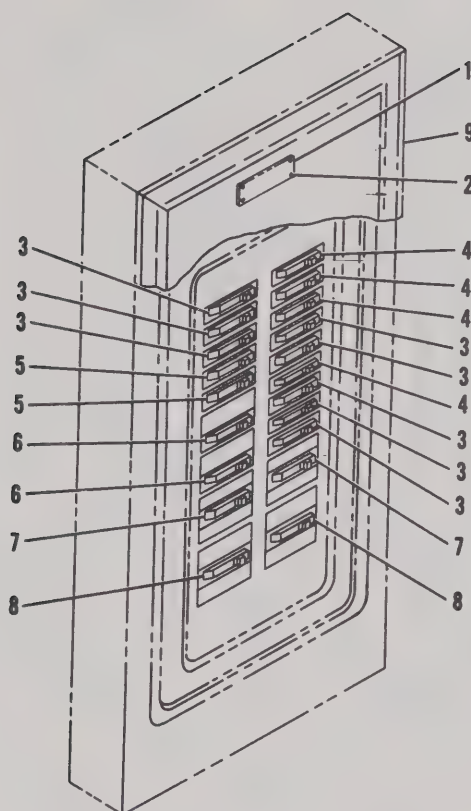
J421/8625-107

FIGURE 6-II. Installation of Extension Light



J421/8625-114

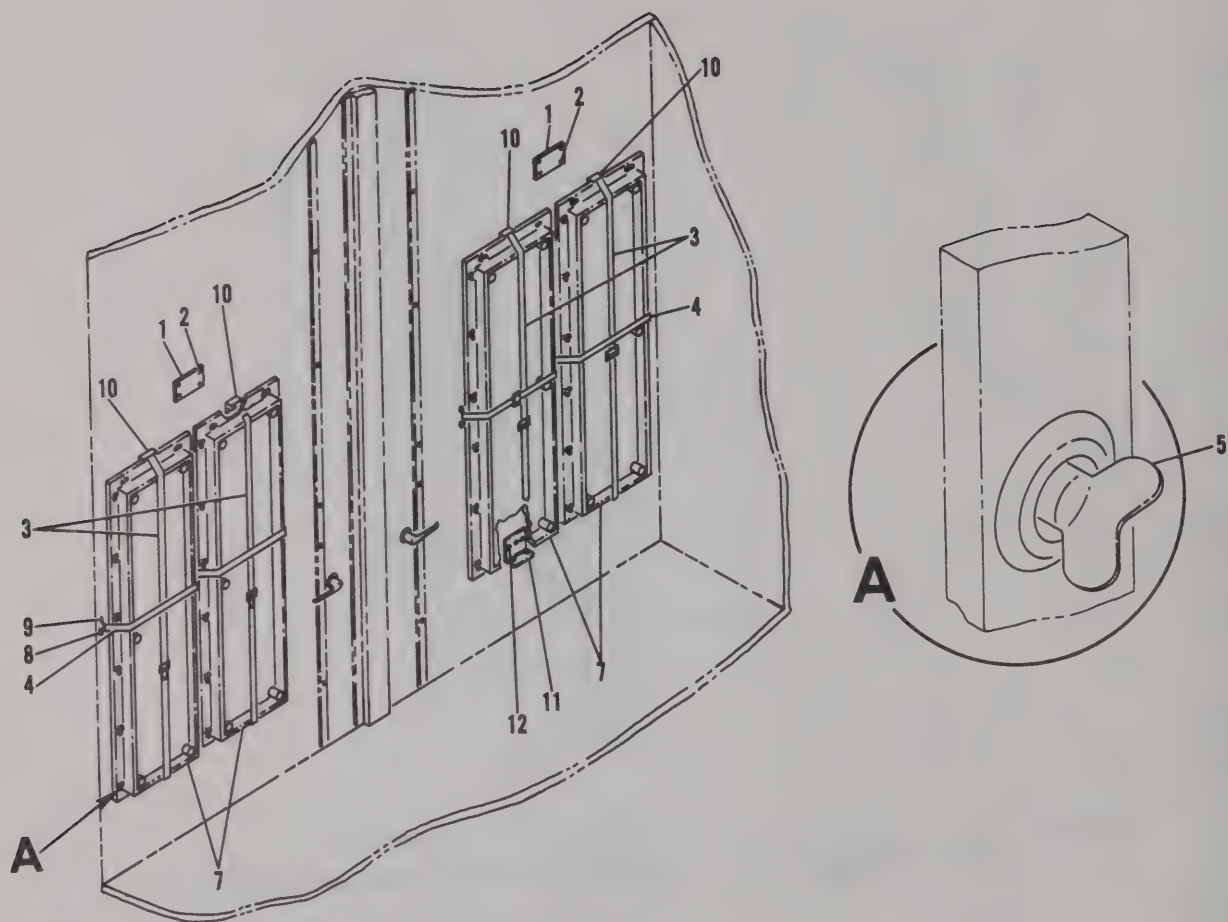
FIGURE 6-12. Installation of Circuit Breaker Box



J421/8625-116

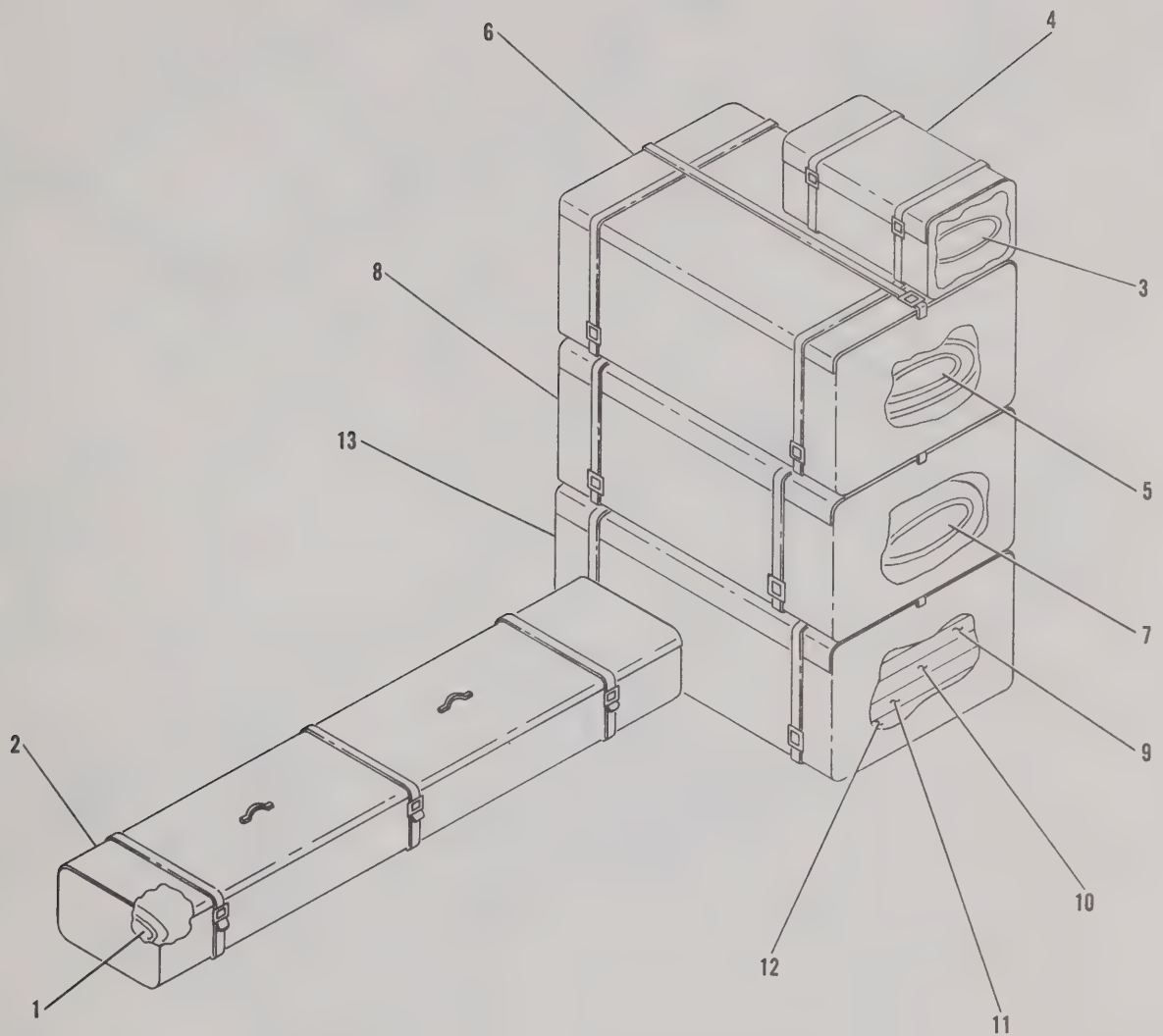
FIGURE 6-13. Assembly of Power Distribution Panel





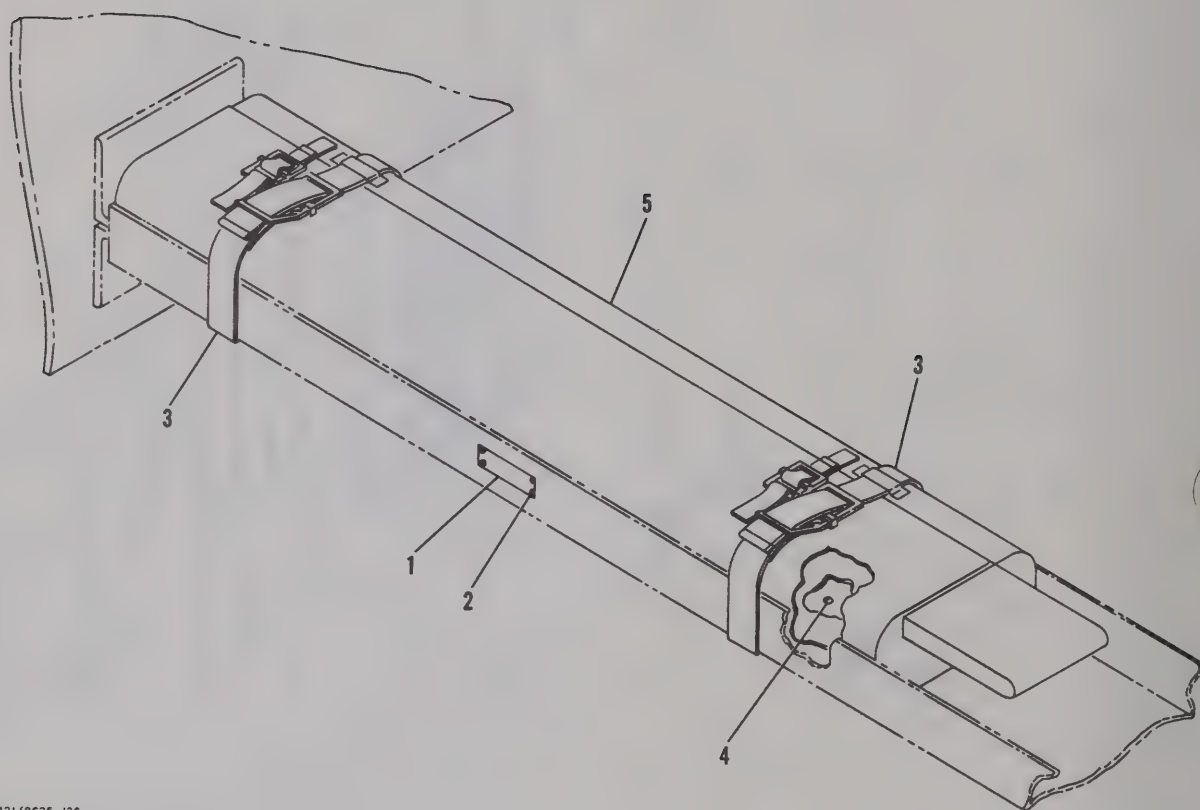
J421/0025-123

FIGURE 6-14. Storage of Air Conditioning Opening Frame



K421/8625-124

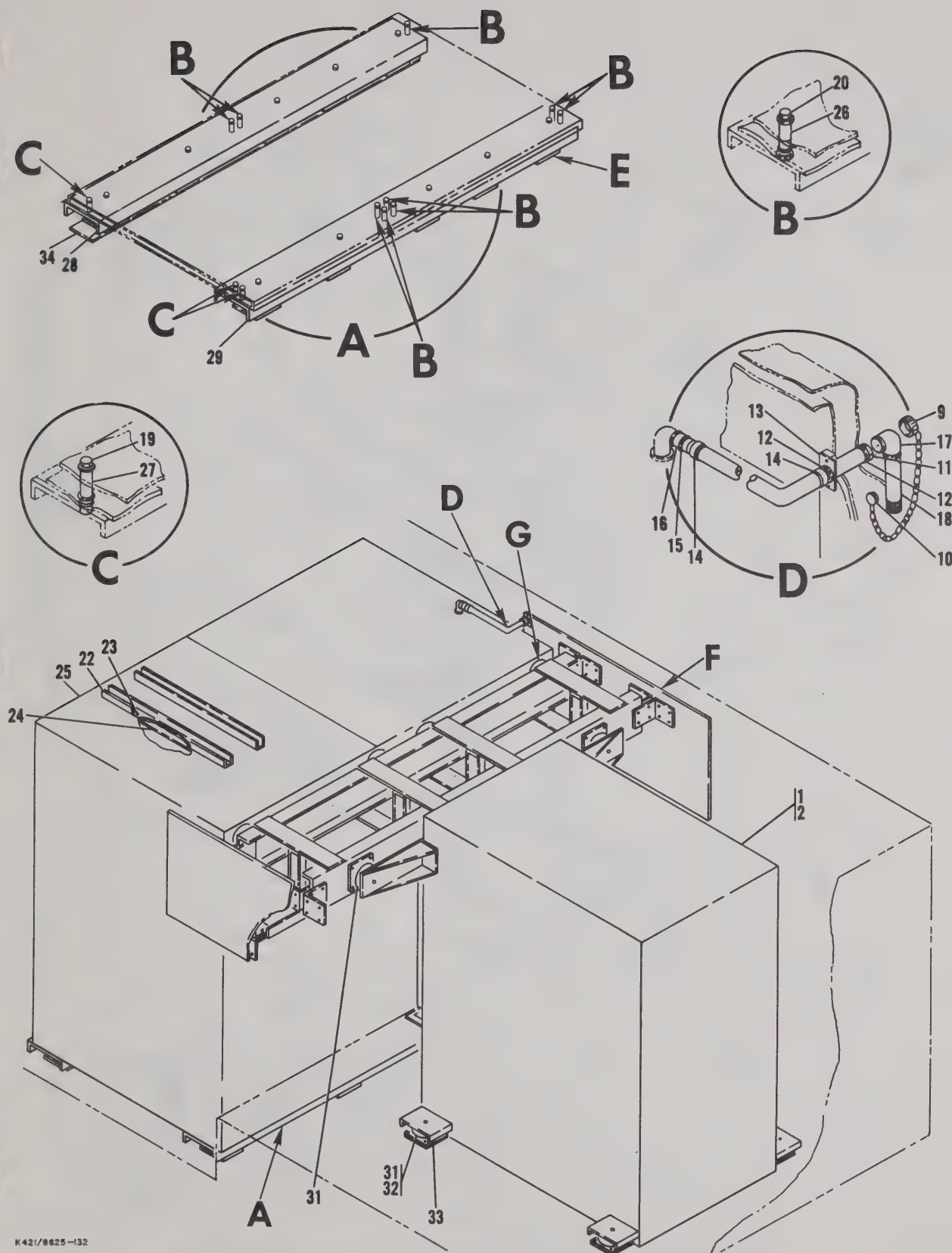
FIGURE 6-15. Storage of Canvas Bag



J421/8625-126

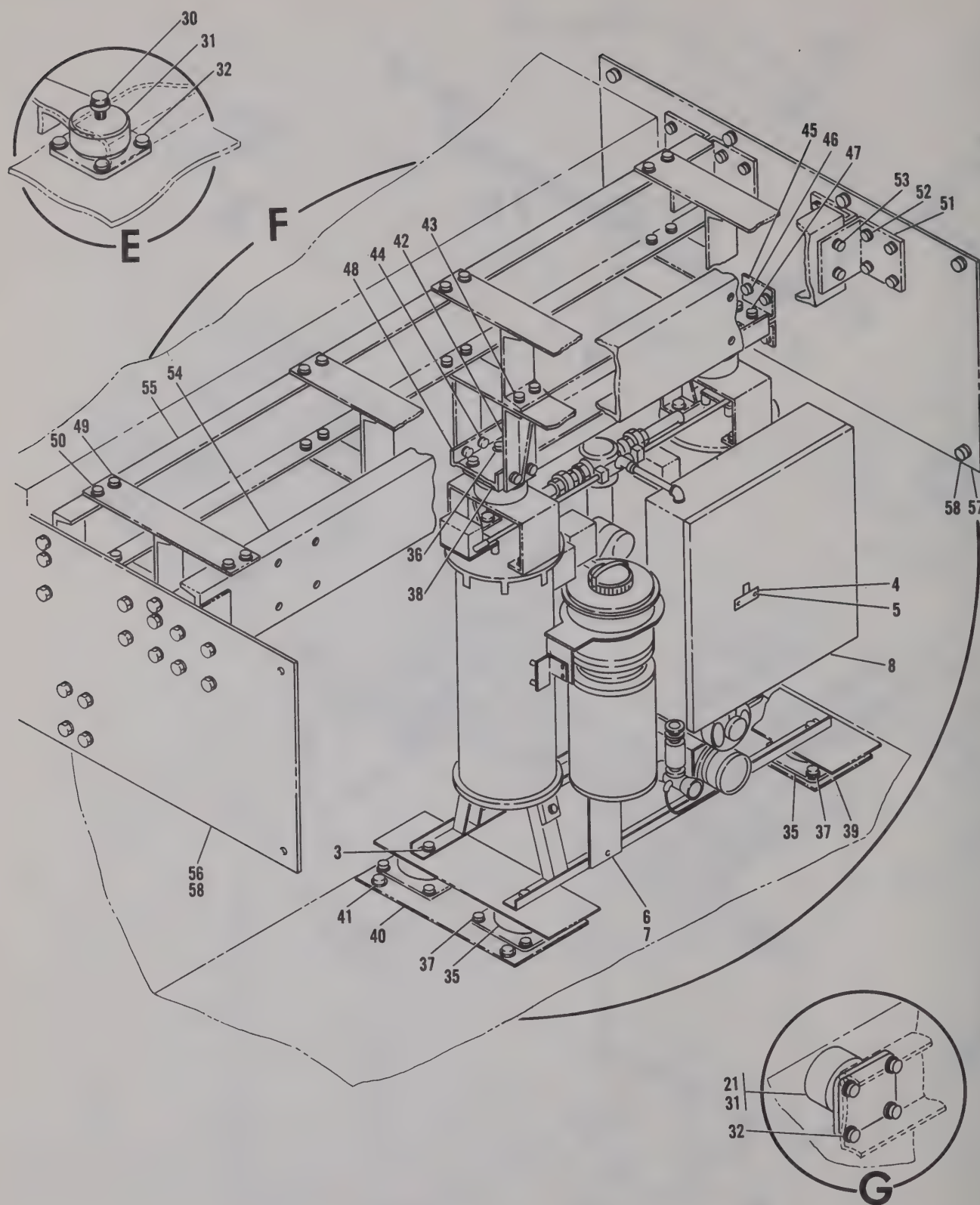
FIGURE 6-16. Storage of Wood Crating Tool Kit





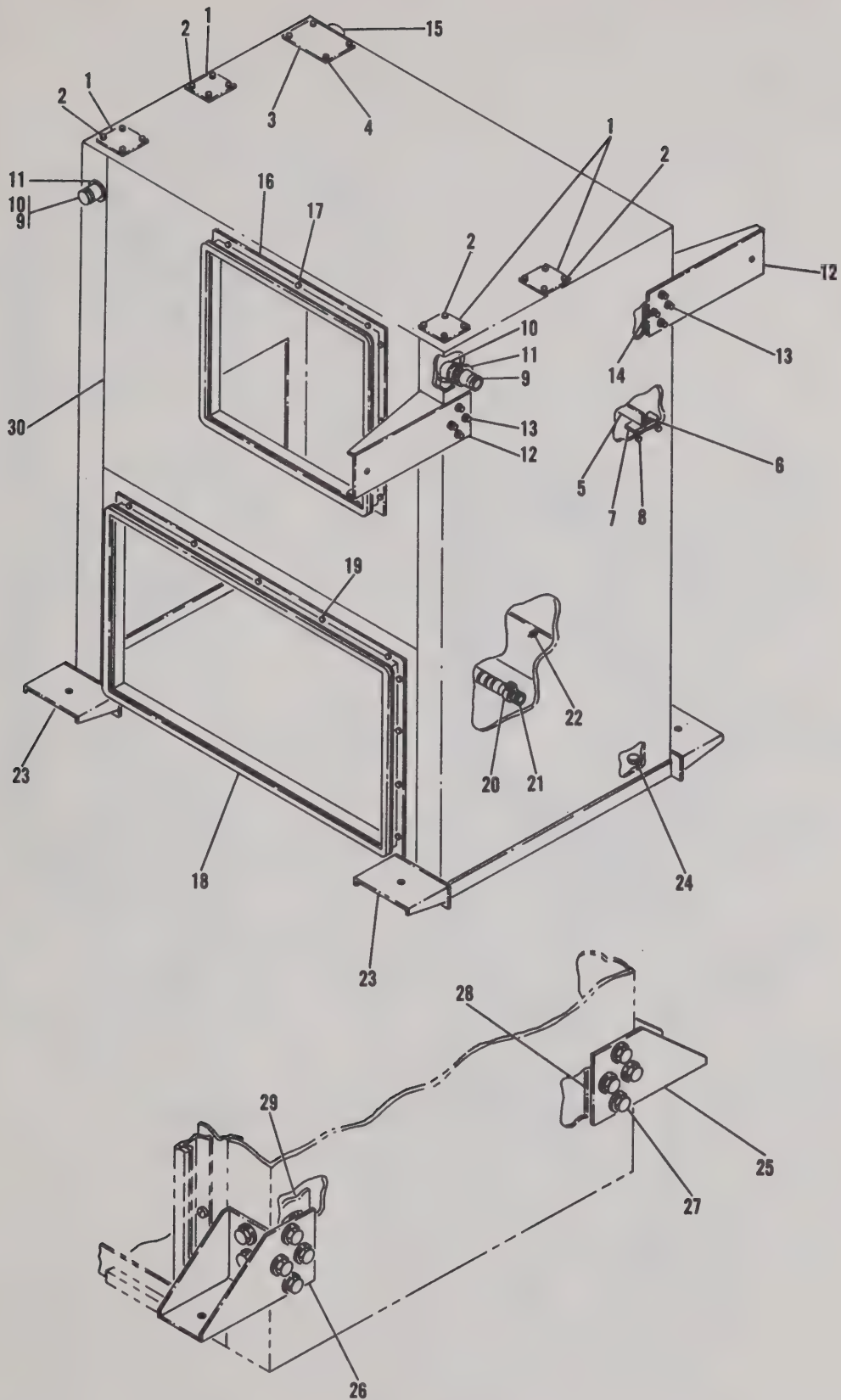
K 421/9625-132

FIGURE 6-17. Installation of Liquid Cooler, Dehumidifier and Amplifier Power Supply (Sheet 1 of 2)



K421/8625-133

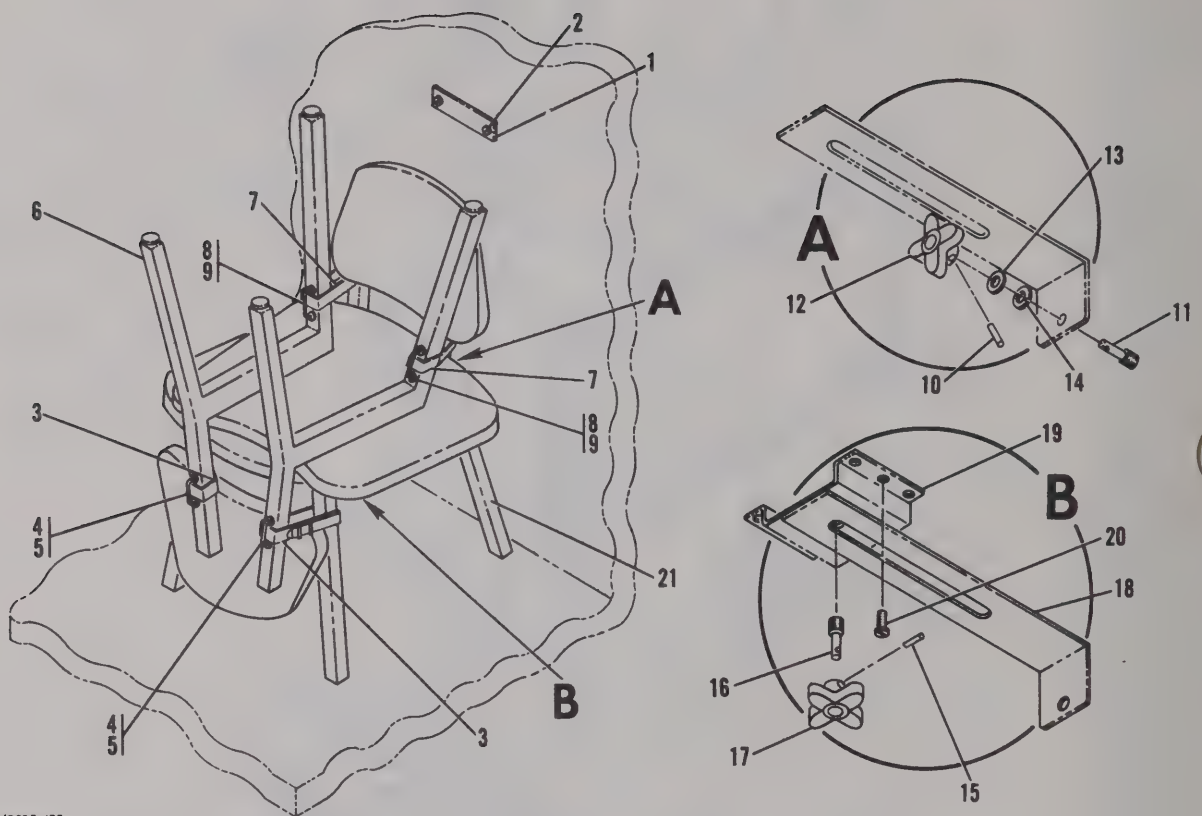
FIGURE 6-17. Installation of Liquid Cooler, Dehumidifier and Amplifier Power Supply (Sheet 2 of 2)



K421/8625-134

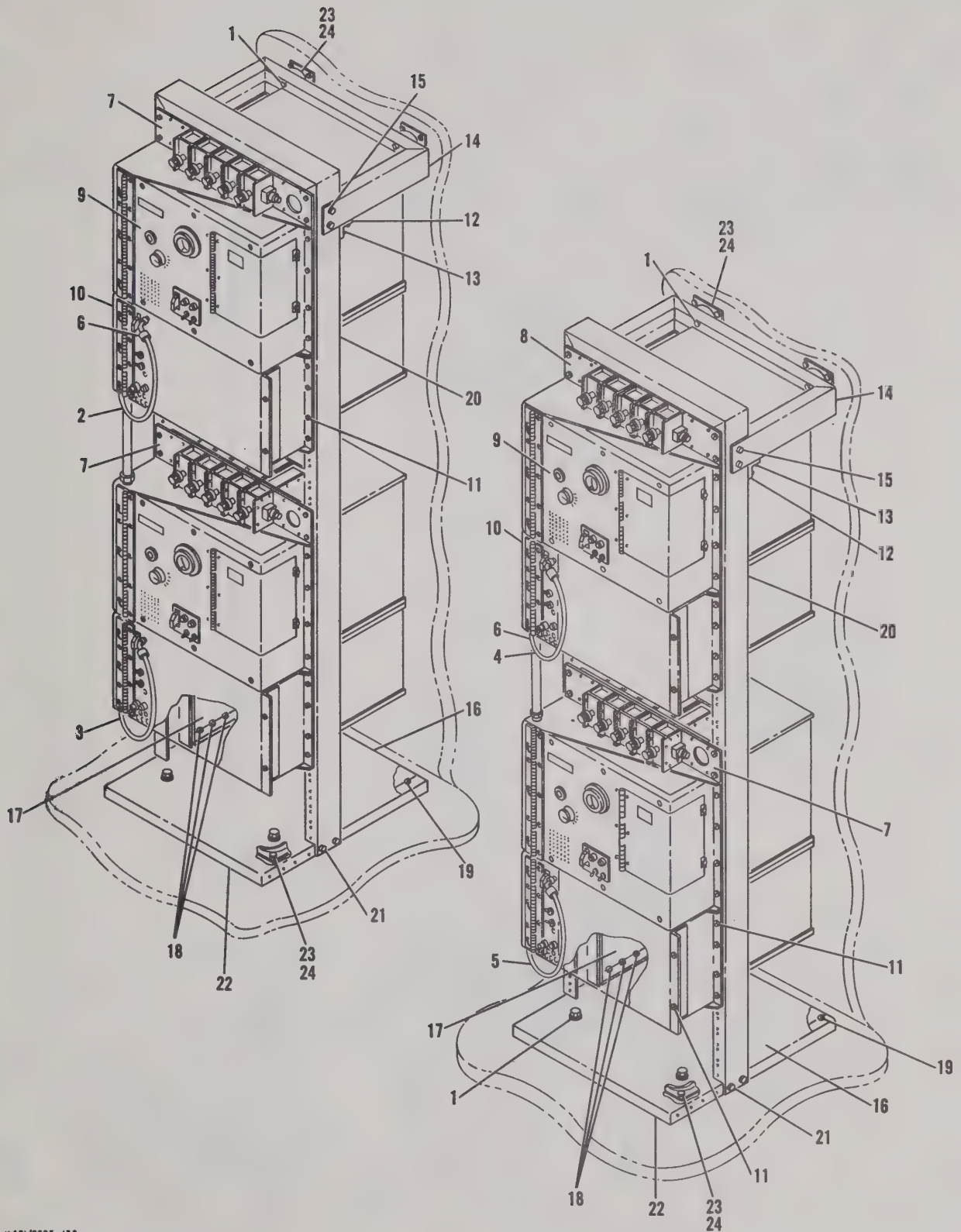
FIGURE 6-18. Assembly of Electron Tube Liquid Cooler





J421/8625-135

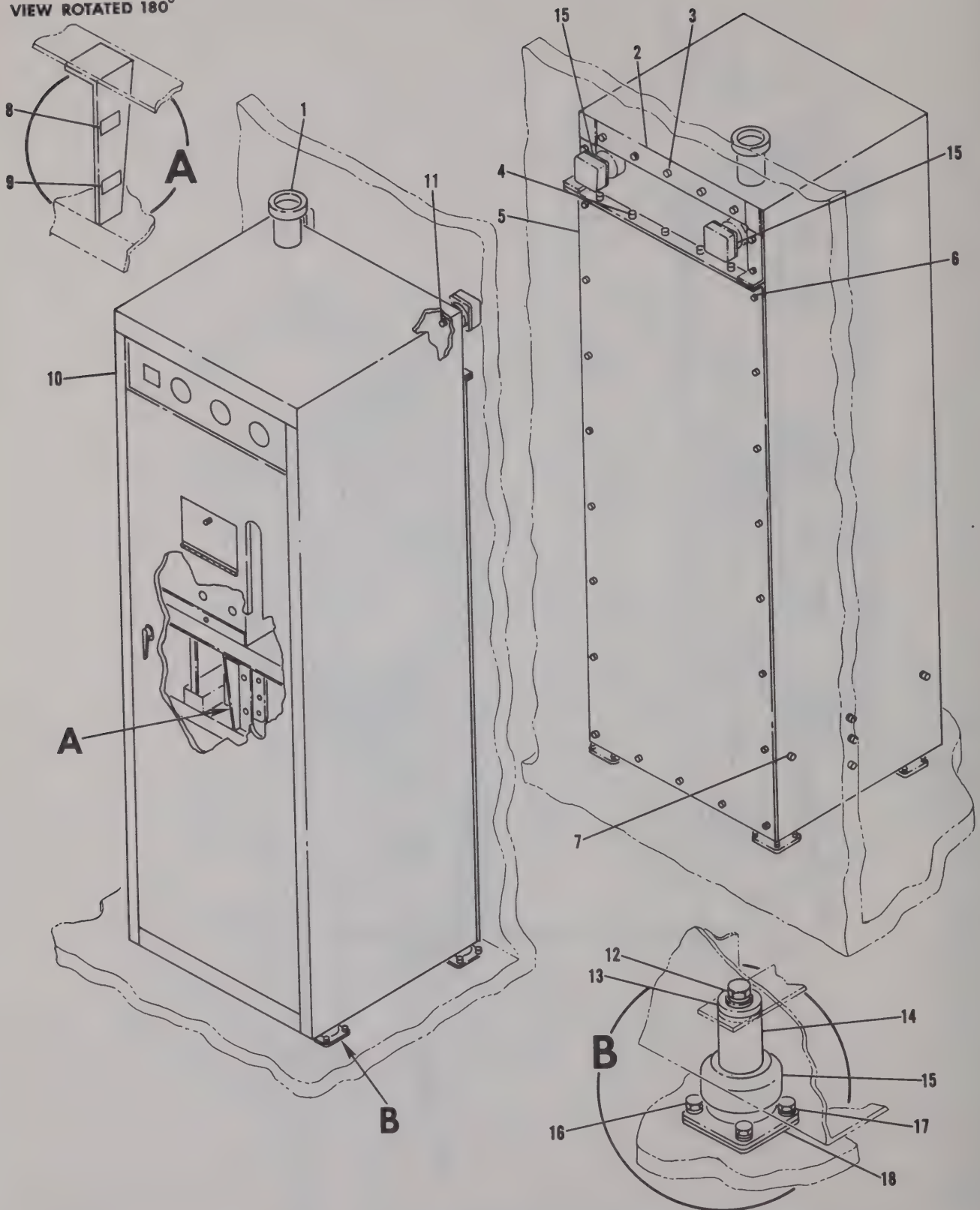
FIGURE 6-19. Installation of Straight Chair



K 42/8625-136

FIGURE 6-20. Installation of Radio Frequency Amplifier

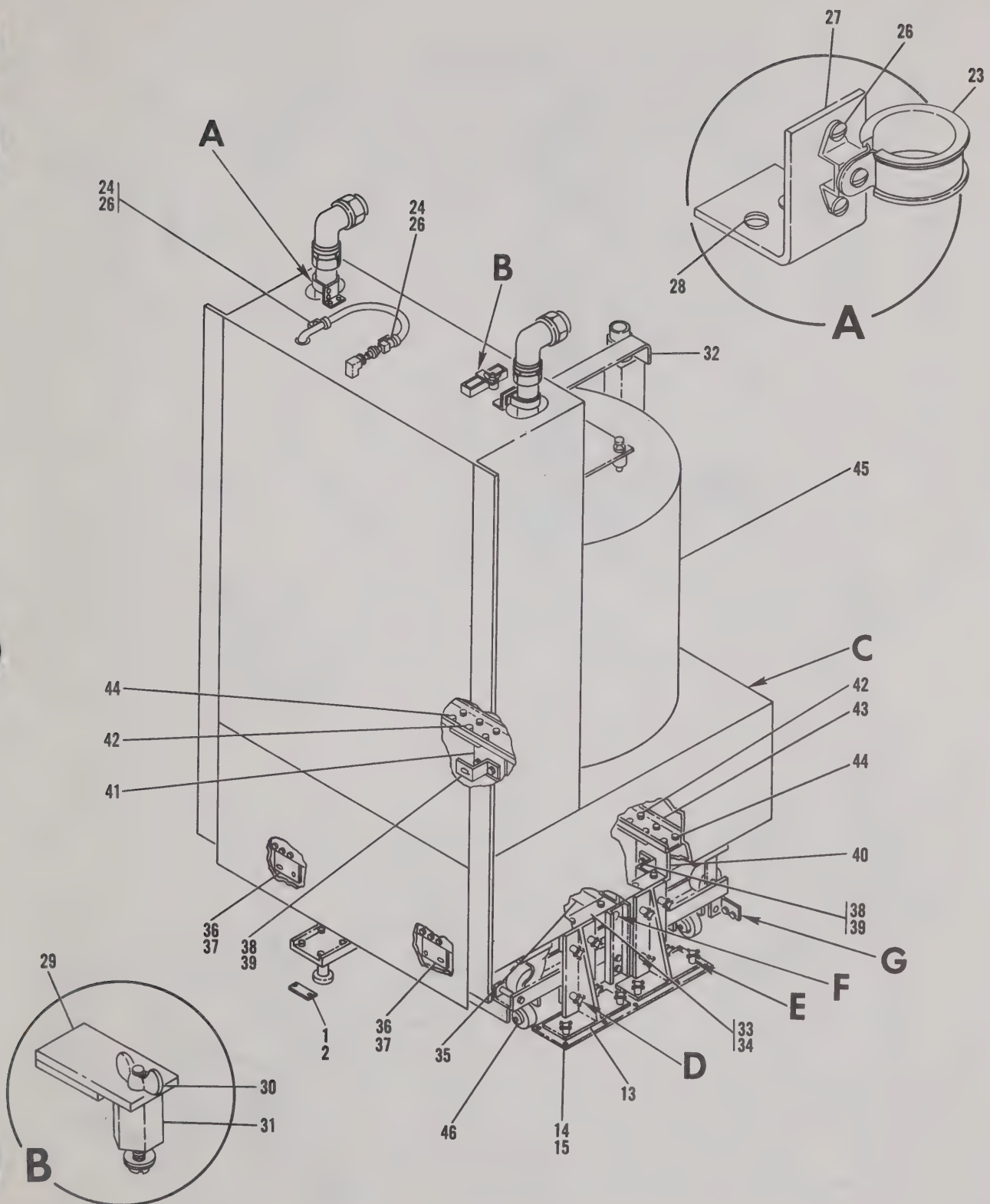
VIEW ROTATED 180°



K421/8625-137

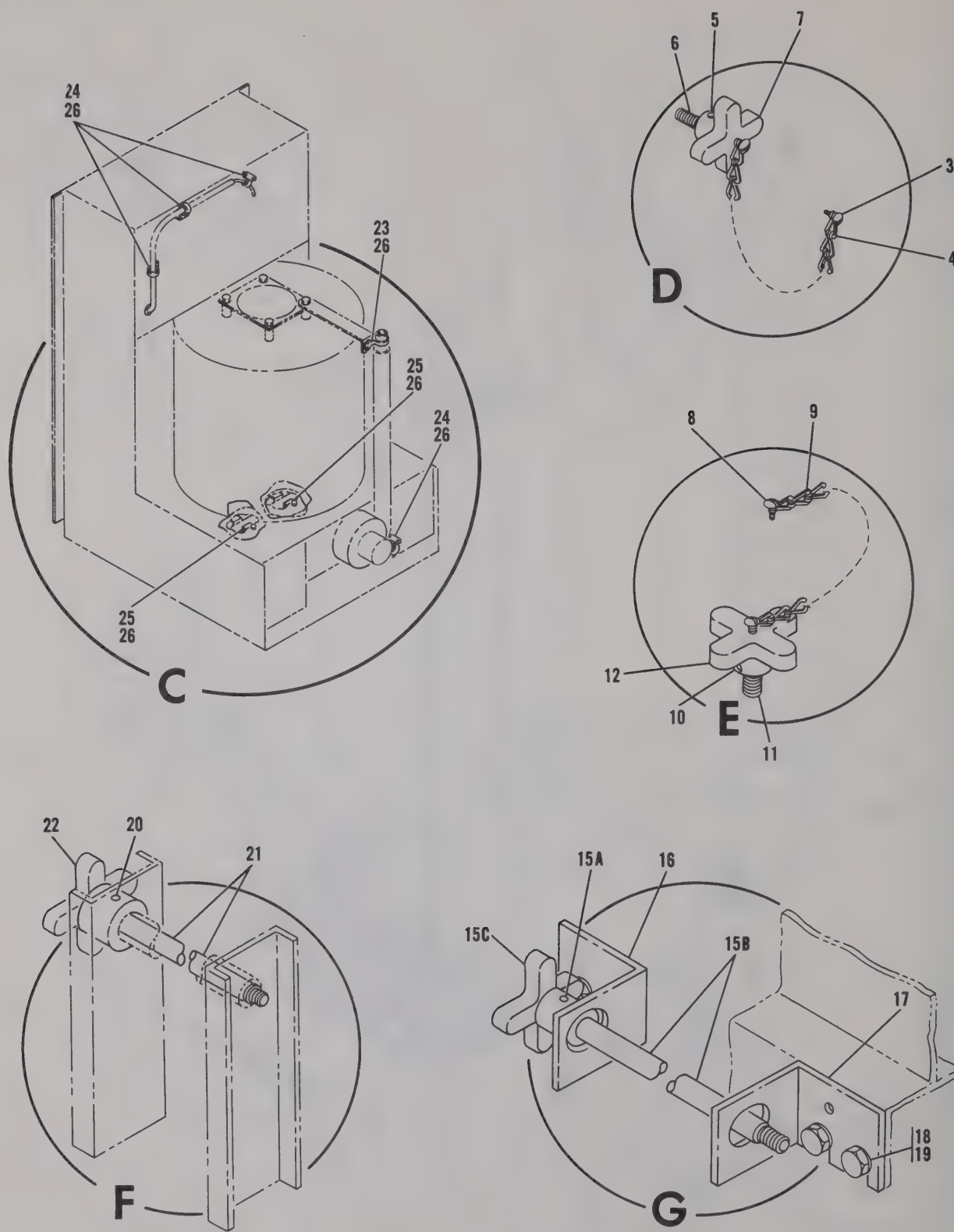
FIGURE 6-21. Assembly and Installation of Electrical Calorimeter





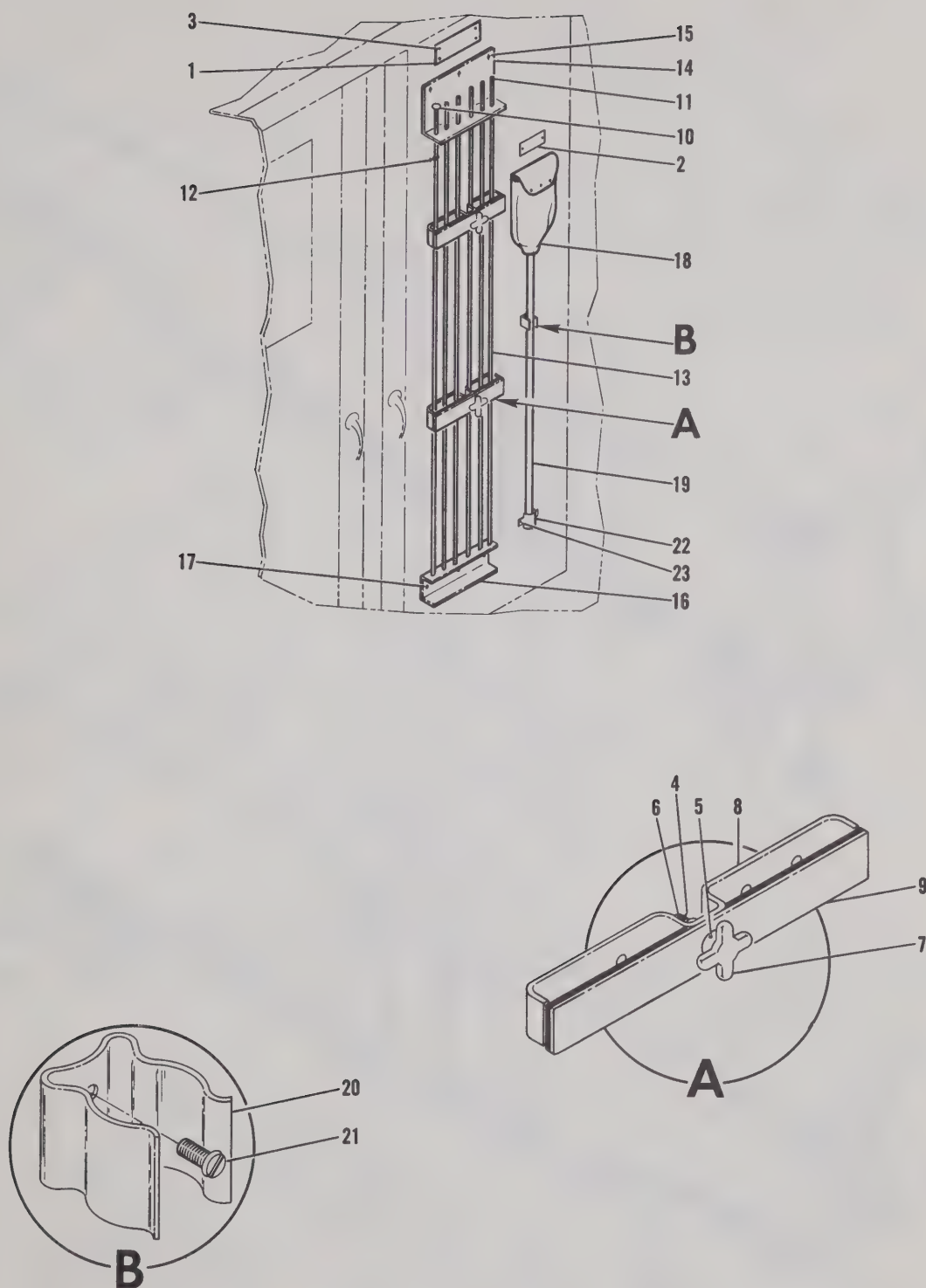
K 421/8625-142

FIGURE 6-22. Installation and Storage of Spare Radio Frequency Amplifier and Dolly (Sheet 1 of 2)



K421/8625-143

FIGURE 6-22. Installation and Storage of Spare Radio Frequency Amplifier and Dolly (Sheet 2 of 2)



K421/8625-150

FIGURE 6-23 Installation of Ground Rod and Broom



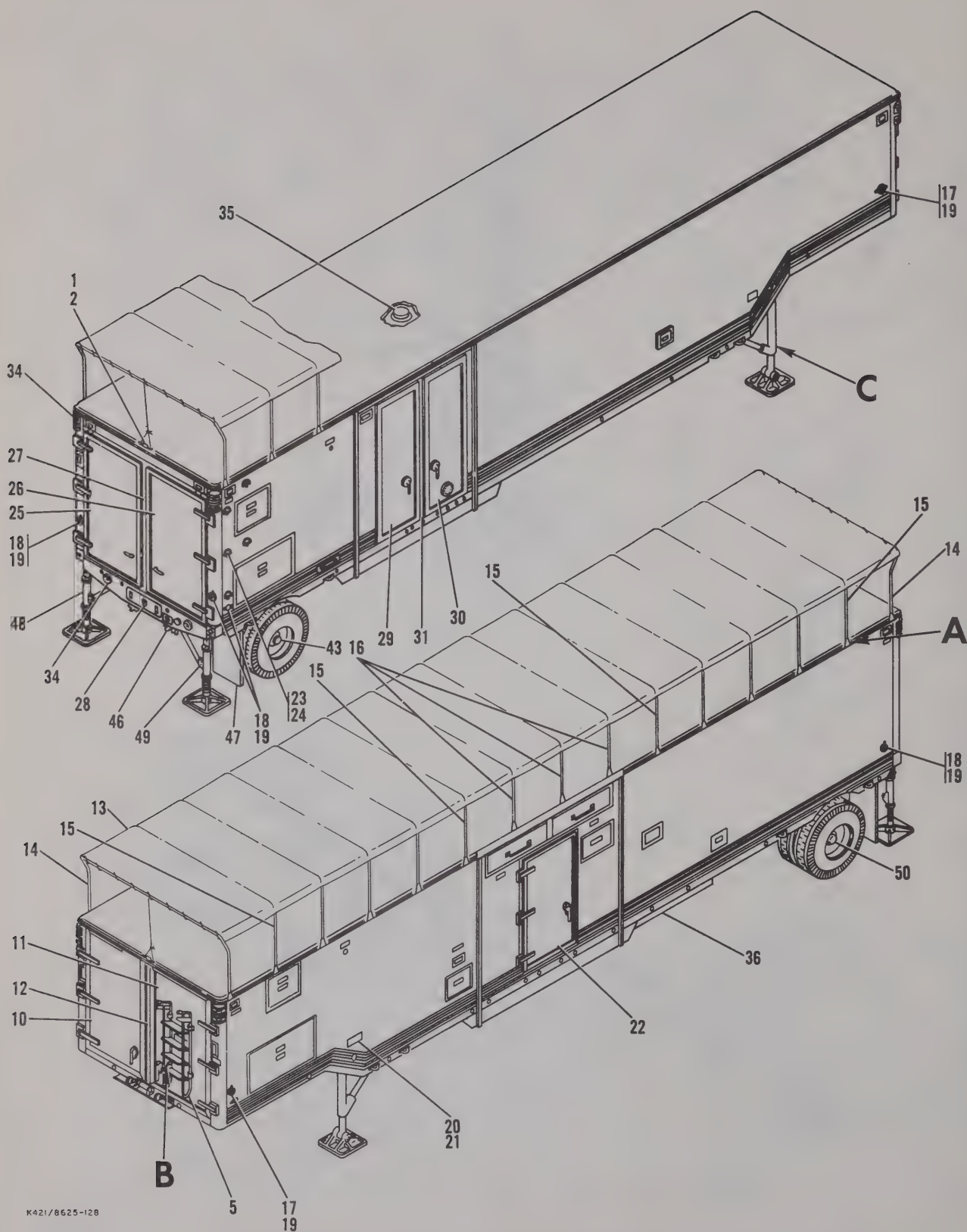
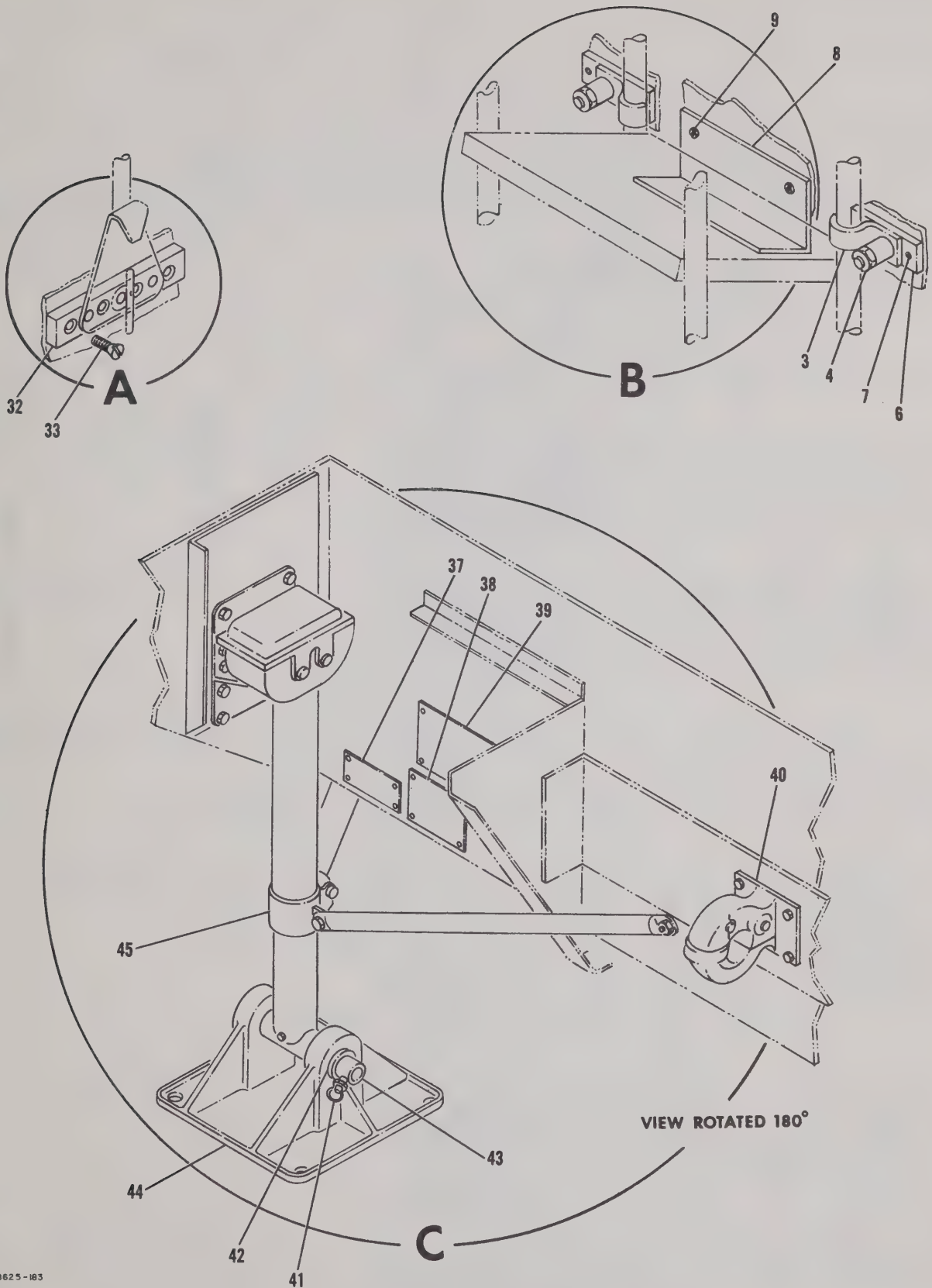


FIGURE 6-24. Semitrailer Van (Sheet 1 of 2)

K421/8625-128



K421/8625-183

FIGURE 6-24. Semitrailer Van (Sheet 2 of 2)

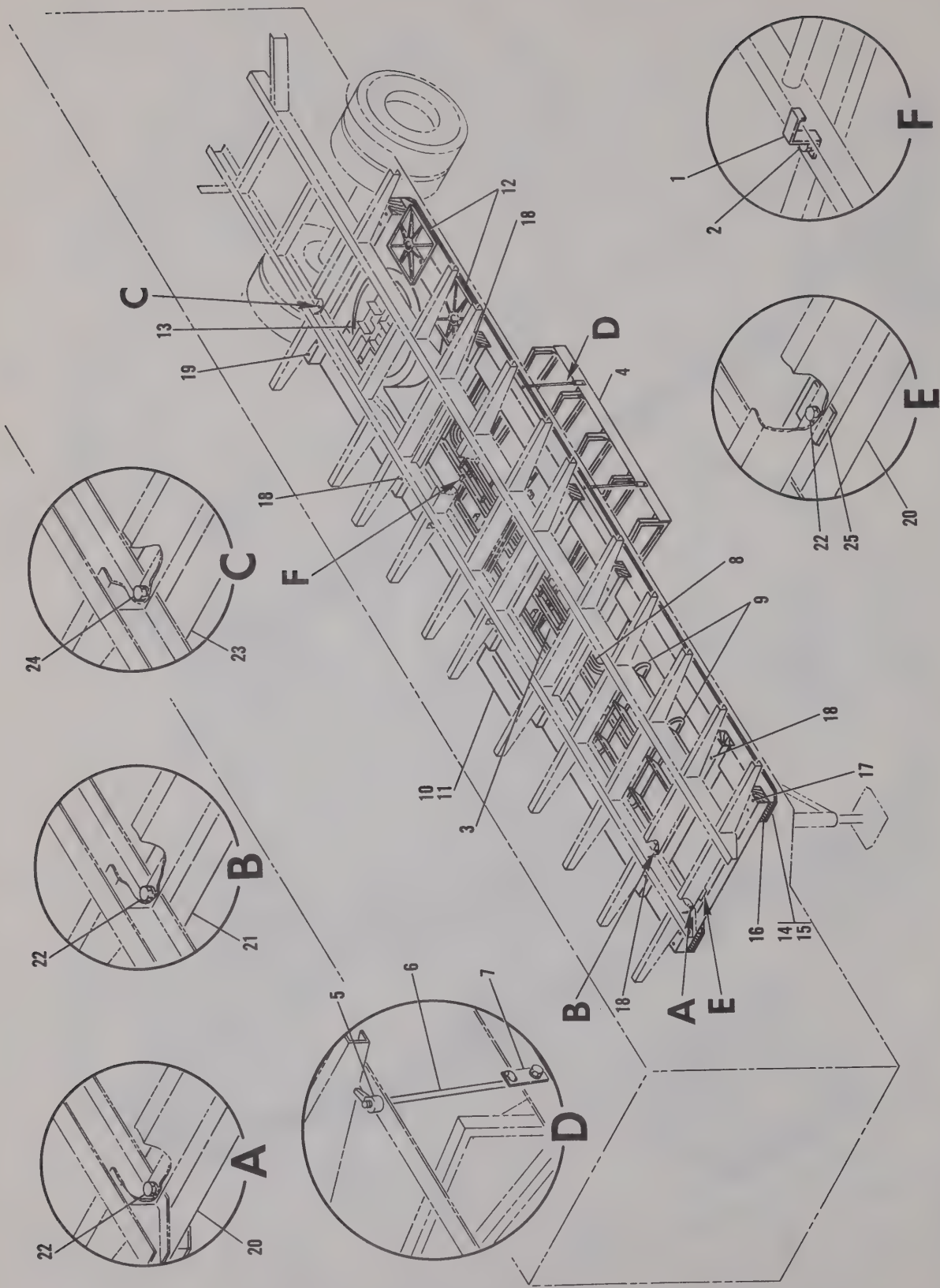


FIGURE 6-25 Equipment Storage

K 421/8625-159



## APPENDIX A

## REFERENCES

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The following publications contain information applicable to the operation and maintenance of Radio Set Group OA-6988/MRC-85(V)1 and Radio Set Group OA-7007/MRC-85(V)2:

DA Pam 310-4	Index of Technical Manuals, Technical Bulletins, Supply Manuals (types 7, 8, and 9), Supply Bulletins, and Lubrication Orders
DA Pam 310-7	U.S. Army Equipment Index of Modification Work Orders
TM 11-5820-746-15	Operator, Organizational, DS, GS, and Depot Maintenance Manual Including Repair Parts and Special Tool Lists: Diplexer-Filter Group OA-6985/MRC-85(v) (Antenna Systems, Inc. 42537G1)
TM 11-5820-750-15	Operator, Organizational, DS, GS, and Depot Maintenance Manual: Cooler, Liquid, Electron Tube HD-431/FRC-39A(V) and HD-661/FRC-39A(V)7 (Radio Engineering Laboratories, Inc. Types 955 and 955B)
TM 11-5820-752-15	Operator, Organizational, DS, GS, and Depot Maintenance Manual (Including Repair Parts and Special Tool Lists): Filter, Tunable Rejection F-789/MRC-98 (Radio Engineering Laboratories, Inc. Part No. S-2038)
TM 11-5820-756-15	Operator, Organizational, DS, GS, and Depot Maintenance Manual (Including Repair Parts and Special Tool Lists): Calorimeter DA-272/FRC-39A(V); DA-358/FRC-39A(V)7, and DA-385/MRC-85(V)2; Dummy Load, Electrical DA-319/MRC-98; and Dummy Load Type 957A (Radio Engineering Laboratories Types 957, 957G, 957D, 957B, and 957A)
TM 11-5820-757-15	Operator, Organizational, DS, GS, and Depot Maintenance Manual: Amplifier-Power Supply Group OA-2973/FRC-39A(V) and OA-4408/MRC-98 (Radio Engineering Laboratories, Inc. Types 954 and 954B)
TM 11-5820-757-25P	Organizational, DS, GS, and Depot Maintenance Repair Parts and Special Tool List: Amplifier-Power Supply OA-2973/FRC-39A(V)

TM 11-5820-760-15

Operator, Organizational, DS, GS, and Depot  
Maintenance Manual Including Repair Parts and  
Special Tool Lists For Dehumidifier, Desiccant,  
Electric HD-501/MRC-85 (McGraw Edison Co.  
KS-16153)

TM 11-5820-762-25P

Organizational, DS, GS, and Depot Maintenance  
Repair Parts and Special Tools List: Radio  
Set Group OA-7007/MRC-85(V)2

TM 11-5820-763-15

Operator, Organizational, DS, GS, and Depot  
Maintenance Manual: Radio Set Group OA-6997(V)/  
MRC-85(V)2

TM 11-5820-763-25P

Organizational, DS, GS, and Depot Maintenance  
Repair Parts and Special Tools List: Radio  
Set Group OA-6997(V)/MRC-85(V)2

## APPENDIX B

### BASIC ISSUE ITEMS

#### Section I. INTRODUCTION

##### B-1. Scope

This appendix lists items comprising an operable equipment and those required for installation, operation, or operator's maintenance for the OA-7007/MRC-85(V)2.

##### B-2. Explanation of Columns

An explanation of the columns is given below.

*a. Source, Maintenance, and Recoverability Codes, Column 1.*

(1) *Source code, column 1a.* The selection status and source for the listed item is noted here. Source codes and their explanations are as follows:

Code	Explanation
P	— Applies to repair parts that are stocked in or supplied from the GSA/DSA, or Army supply system, and authorized for use at indicated maintenance categories.
A	— Applies to assemblies that are not procured or stocked as such but are made up of two or more units, each of which carry individual stock numbers and descriptions and are procured and stocked and can be assembled by units at indicated maintenance categories.
X	— Applies to parts and assemblies that are not procured or stocked; the mortality of which normally is below that of the applicable end item; and the failure of which should result in

##### Code

##### Explanation

retirement of the end item from the supply system.

X2 — Applies to repair parts which are not stocked. The indicated maintenance category requiring such repair parts will attempt to obtain them through cannibalization; if not obtainable through cannibalization, such repair parts are to be requisitioned with supporting justification through normal supply channels.

(2) *Maintenance code, column 1b.* The lowest category of maintenance authorized to install the listed item is noted here.

##### Code

##### Explanation

C ..... Operator/crew

(3) *Recoverability code, column 1c.* The information in this column indicates whether serviceable items should be returned for recovery or salvage. Recoverability code and its explanation is as follows:

#### NOTE

Where there is no code indicated in the recoverability column, the part will be considered expendable.

##### Code

##### Explanation

R — Applies to repair parts and assemblies that are economically repairable at DSU and GSU activities and are normally furnished by supply on an exchange basis.



*b. Federal Stock Number, Column 2.* This column indicates the Federal stock number for the item.

*c. Description, Column 3.* The Federal item name, a five-digit manufacturer's code and a part number are included in this column. Model column is not used.

*d. Unit of Issue, Column 4.* The unit of issue is each unless otherwise indicated.

*e. Quantity Incorporated in Unit Pack, Column 5.* Not used.

*f. Quantity Incorporated in Unit, Column 6.* The total quantity of the item used in the equipment is given in this column.

*g. Quantity Authorized, Column 7.* The total quantity of an item required to be on hand and necessary for the operation and maintenance of the equipment is given in this column.

*h. Illustrations, Column 8.*

(1) *Figure number, column 8a.* The number of the illustration in which the item is shown is indicated in this column.

(2) *Item or symbol number, column 8b.* The item number used to reference the item in the illustration appears in this column.

### B-3. Federal Supply Codes

This paragraph lists the Federal supply code with the associated manufacturer's name.

<i>Code</i>	<i>Manufacturer</i>
00000 .....	Ordnance Corps.
04809 .....	Square D Co., Assembly Division
05241 .....	Lectro Products Div. of McGraw-Edison Co.
33525 .....	Walter Kidde and Co., Inc.
40670 .....	Miller Trailers, Inc.
45092 .....	Osborn Mfg. Co.
47619 .....	Replaced by 05241
72041 .....	Eagle Electric Mfg. Co., Inc.
74451 .....	Wicks Industries, Inc.
74547 .....	Replaced by 90190
77633 .....	Radio Engineering Laboratories
81922 .....	Replaced by 04809
90190 .....	Kearney - National, Inc.

TM 11-5820-762-15  
SECTION II. BASIC ISSUE ITEMS

B-3

BASIC ISSUE ITEMS LIST														
(1)		(3)						(8)						
(a) SOURCE CD	(b) MAINT. CD	(2) FEDERAL STOCK NUMBER	DESCRIPTION						(4) UNIT OF ISSUE	(5) QTY INC IN UNIT PACK	(6) QTY INC IN UNIT	(7) QTY AUTH	ILLUSTRATIONS	
			MODEL										(a) FIGURE NUMBER	(b) ITEM OR SYMBOL NUMBER
1	2	3	4	5	6									
P	C						END VEHICULAR TARP BOWS: 40670; 31681045				2	2	6-24	14
P	C						EXTENSION LIGHT: 72041; 495				1	1	6-11	3
P	C R						FILTER, TUNABLE REJECTION F-789/MRC-98; 77633; S-2038				1	1	6-20	8
P	C						FIRE EXTINGUISHER: 33525; 5-KS				1	1	6-10	4
P	C						FOLDING STEP: 40670; 7092486				12	12	6-24	23
A	C R						FRAME, AIR CONDITIONING OPENING: 74451; 7750545-501				4	4	6-14	
P	C						INTERMEDIATE VEHICULAR TARP BOW: 40670; 3168898				3	3	6-24	16
P	C						INTERMEDIATE VEHICULAR TARP BOW: 40670; 3168958				10	10	6-24	15
A	C R						KLYSTRON CARRIAGE AND DOLLY: 74451; 8750653-501				1	1	6-22	
P	C						KLYSTRON CARRIAGE AND DOLLY TRACK: 74451; 7750539-501				2	2	6-9	
A	C R						LEFT HAND LEVELING JACK: 40670; 31681025-1				1	1	6-24	48
A	C R						LINE SECTION AND MISCELLANEOUS ITEMS STORAGE CASE: 74451; 8760015-501				1	1	6-8	52
P	C						MAIN CIRCUIT BREAKER: 04809; ML3-426-S				1	1	6-12	2
A	C R						METER ASSEMBLY, ELECTRICAL ME-289A/MRC-85(V)2: 74451; 8750575-501				1	1	6-12	6
A	C R						MOUNTING ASSEMBLY, FILTER AND DIPLEXER: 74451; 8750595-501				1	1	6-8	45
X	C						PANEL, POWER DISTRIBUTION SB-2324/MRC-85(V)2: 81922; QOC30S				1	1	6-13	9
X2	C						PERSONNEL LADDER: 40670; 2949925				2	2	6-25	9



BASIC ISSUE ITEMS LIST															
(1)		(c)	(2)	(3)						(4)	(5)	(6)	(7)	(8)	
				FEDERAL STOCK NUMBER	DESCRIPTION									UNIT OF ISSUE	QTY INC IN UNIT PACK
1	2	3	4		5	6									
A	C	R											1	6-8	15
A	C	R											1	6-8	23
A	C	R											1	6-24	49
A	C	R											1	6-8	61
A	C	R											1	6-8	19
P	C												1	6-25	
A	C	R											1	6-8	49
P	C												1	6-25	
P	C												1	6-25	13
A	C	R											1	6-19	
A	C	R											1	6-8	29
A	C	R											1	6-8	39
P	C												1	6-25	3
P	C												1	6-24	5
P	C												1	6-15	6
A	C												1	6-8	38
P	C												1	6-16	5



## APPENDIX C

### MAINTENANCE ALLOCATION

---

#### Section I. INTRODUCTION

##### C-1. General

This appendix provides a summary of the maintenance operations covered in the equipment literature. It authorizes categories of maintenance for specific maintenance functions on repairable items and components and the tools and equipment required to perform each function. This appendix may be used as an aid in planning maintenance operations.

##### C-2. Maintenance Functions

Maintenance functions will be limited to and defined as follows:

*a. Inspect.* To determine serviceability of an item by comparing its physical, mechanical, and electrical characteristics with established standards.

*b. Test.* To verify serviceability and to detect incipient electrical or mechanical failure by use of special equipment such as gages, meters, etc. This is accomplished with external test equipment and does not include operation of the equipment and operator type tests using internal meters or indicating devices.

*c. Service.* To clean, to preserve, to charge, and to add fuel, lubricants, cooling agents, and air. If it is desired that elements, such as painting and lubricating, be defined separately, they may be so listed.

*d. Adjust.* To rectify to the extent necessary to bring into proper operating range.

*e. Align.* To adjust two or more components or assemblies of an electrical or mechanical system so that their functions are properly synchronized. This does not include setting the frequency control knob of radio receivers or transmitters to the desired frequency.

*f. Calibrate.* To determine the corrections to be made in the readings of instruments or test equipment used in precise measurement. Consists of the comparison of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared with the certified standard.

*g. Install.* To set up for use in an operational environment such as an encampment, site, or vehicle.

*h. Replace.* To replace unserviceable items with serviceable like items.

*i. Repair.* To restore an item to serviceable condition through correction of a specific failure or unserviceable condition. This function includes, but is not limited to welding, grinding, riveting, straightening, and replacement of parts other than the trial and error replacement of running spare type items such as fuses, lamps, or electron tubes.

*j. Overhaul.* Normally, the highest degree of maintenance performed by the Army in order to minimize time work in process is consistent with quality and economy of operation. It consists of that maintenance necessary to restore an item to



completely serviceable condition as prescribed by maintenance standards in technical publications for each item of equipment. Overhaul normally does not return an item to like new, zero mileage, or zero hour condition.

*k. Rebuild.* The highest degree of materiel maintenance. It consists of restoring equipment as nearly as possible to new condition in accordance with original manufacturing standards. Rebuild is performed only when required by operational considerations or other paramount factors and then only at the depot maintenance category. Rebuild reduces to zero the hours or miles the equipment, or component thereof, has been in use.

*l. Symbols.* The uppercase letter placed in the appropriate column indicates the lowest level at which that particular maintenance function is to be performed.

### C-3. Explanation of Format

*a. Column 1, Group Number.* Column 1 lists group numbers, the purpose of which is to identify components, assemblies, subassemblies, and modules with the next higher assembly.

*b. Column 2, Functional Group.* Column 2 lists the noun names of components, assemblies, subassemblies, and modules on which maintenance is authorized.

*c. Column 3, Maintenance Functions.* Column 3 lists the maintenance category at which performance of the specific maintenance function is authorized. Authorization to perform a function at any category also includes authorization to perform that function at higher categories. The codes used represent the various maintenance categories as follows:

Code	Maintenance category
C .....	Operator/crew
O .....	Organizational maintenance
F .....	Direct support maintenance
H .....	General support maintenance
D .....	Depot maintenance

*d. Column 4, Tools and Test Equipment.* Column 4 specifies, by code, those tools and test equipments required to perform the designated function. The numbers appearing in this column refer to specific tools and test equipment which are identified in table I.

*e. Column 5, Remarks.* Self-explanatory.

### C-4. Explanation of Format of Table I, Tool and Test Equipment Requirements

The columns in table I are as follows:

*a. Tools and Equipment.* The numbers in this column coincide with the numbers used in the tools and equipment column of the maintenance allocation chart. The numbers indicate the applicable tool for the maintenance function.

*b. Maintenance Category.* The codes in this column indicate the maintenance category normally allocated the facility.

*c. Nomenclature.* This column lists tools, test, and maintenance equipment required to perform the maintenance functions.

*d. Federal Stock Number.* This column lists the Federal stock number of the specific tool or test equipment.

*e. Tool Number.* Not used.

SECTION II. MAINTENANCE ALLOCATION CHART												
GROUP NUMBER	COMPONENT ASSEMBLY NOMENCLATURE	MAINTENANCE FUNCTIONS										REMARKS
		INSPECT	TEST	SERVICE	ADJUST	ALIGN	CALIBRATE	INSTALL	REPLACE	REPAIR	OVERHAUL	REBUILD
L	RADIO GROUP SET OA-7007/MRC-85(V)2	0	F							F		
LA	POWER DISTRIBUTION PANEL SB-2324/MRC-85(V)2	0	F							F		
LB	METER ASSEMBLY, ELECTRICAL ME-289A/MRC-85(V)2	0	F							F		
LC	ELECTRICAL CONNECTOR ASSEMBLY	0	F							F		
LD	POWER SUPPLY AMPLIFIER OA-2973/FRG-39A(V)								#	#		
LE	RADIO FREQUENCY AMPLIFIER AM-3634/MRC-98								#	#		
LF	RADIO SET GROUP OA-2990/FRG-39A(V)								#	#		
LH	FILTER, TUNABLE REJECTION F-789/MRC-98								#	#		
LJ	CALORIMETER DA-272/FRG-39A(V)								#	#		
LK	DEHUMIDIFIER HD-501/MRC-85								#	#		
LL	ELECTRONIC TUBE LIQUID COOLER HD-661/FRG-39A(V)7 AND, HD-431/FRG-39A(V)								#	#		

# Indicates that maintenance guidance will be found in documents referenced in remarks column.

TABLE I. TOOL AND TEST EQUIPMENT REQUIREMENTS

TOOLS AND EQUIPMENT	MAINTENANCE CATEGORY	Recommended in Manual	NOMENCLATURE	Available on Site	FEDERAL STOCK NUMBER	TOOL NUMBER
1	F,H	MULTIMETER AN/PSM-6	MULTIMETER AN/PSM-6			
2	F,H	TOOL KIT, ELECTRONIC EQUIPMENT TK-100/g	TOOL KIT, ELECTRONIC EQUIPMENT TK-100/g	TOOL KIT, ELECTRONIC EQUIPMENT TK-100/g	5180-064-5178	



# CROSS-REFERENCE INDEX

(Prefix each Reference Number with the Chapter Number denoted by the Column.)  
(KEY: Numbers preceded by "f" are illustrations; "t" are tables; others are paragraphs.)

OFFICIAL NOMENCLATURE Common Name	Chapter 2 Installation	Chapter 3 Operation	Chapter 4 Principles of Operation	Chapter 5		
				Org./Field Maintenance	Align- ment	Special Maintenance
AMPLIFIER-POWER SUPPLY GROUP, OA-2973/FRC-39A(V) Power Amplifier, 10-kw	68, f3	24, 26	4, 10, f1			
AMPLIFIER RADIO FREQUENCY AM-3634/MRC-98 Parametric Amplifier, REL 1055	f3	24, 25	22, f1	t2		
CALORIMETER, DA-272/FRC-39A(V) Dummy Load, REL 957	f3		14, f1			
CONNECTOR ASSEMBLY, ELECTRI- CAL U-325A/MRC-85(V)2 Signal Line Extension Panel p/o Signal Line Extension Box	t2, f15		30, 46	23		
CONVERTER FREQUENCY, ELECTRONIC CV-1465/MRC-98 Converter, REL 1054		24, 25				
Converter, REL 1054		24, 25				
CONVERTER, FREQUENCY, ELECTRONIC CV-1465/MRC-98						
DEHUMIDIFIER, DESICCANT, ELECTRIC HD-501/MRC-85(V) Dehydrator			16, f1			
Dehydrator	f3		16, f1			
DEHUMIDIFIER, DESICCANT, ELECTRIC HD-501/MRC-85(V)						
Dummy Load	f3		14, f1			
CALORIMETER, DA-272/FRC-39A(V)						
ELECTRON TUBE LIQUID COOLER, HD-431/FRC-39A(V)	f3	f4, t4	12, f1			
Heat Exchanger, REL 955						

## CROSS-REFERENCE INDEX (cont)

OFFICIAL NOMENCLATURE Common Name	Chapter 2 Installation	Chapter 3 Operation	Chapter 4 Principles of Operation	Chapter 5		
				Org/Field Maintenance	Align- ment	Special Maintenance
ELECTRON TUBE LIQUID COOLER, HD-661/FRC-39A(V) <sup>7</sup> Heat Exchanger, REL 955B	f3	f4, t4	12, f1			
FILTER, TUNABLE, REJECTION, F-789/MRC 98	t2					
RF Preslector, REL S-2038						
Heat Exchanger, REL 955	f3	f4, t4	12, f1			
ELECTRON TUBE LIQUID COOLER, HD-431/FRC-39A(V)						
Heat Exchanger, REL 955B	f3	f4, t4	12, f1			
ELECTRON TUBE LIQUID COOLER, HD-661/FRC-39A(V) <sup>7</sup>						
METER ASSEMBLY ELECTRICAL ME-289A/MRC-85(V) <sup>2</sup> Power Monitor Panel		f1, f5, t5	42	17, t2		
PANEL, POWER DISTRIBUTION SB-2324/MRC-85-85(V) <sup>2</sup> Power Distribution Panel p/o Distribution Box	f3	10, f1	40, f1	18, t2		
Parametric Amplifier, REL 959 RADIO SET GROUP, OA-2990/FRC- 39A(V)	f3, t2	24, 25	22, f1			
Parametric Amplifier, REL 1055 AMPLIFIER, RADIO FREQUENCY AM-3634/MRC-98	f3, t2	24, 25	22, f1	t2		
Power Amplifier, 10-kw AMPLIFIER-POWER SUPPLY GROUP, OA-2973/FRC-39A(V)	68, f3		4, 10, f1			
Power Distribution Panel p/o Distribution Box PANEL, POWER DISTRIBUTION S-2324/MRC-85(V) <sup>2</sup>	f3	10, f1	40	18, t2		

## CROSS-REFERENCE INDEX (cont)

OFFICIAL NOMENCLATURE Common Name	Chapter 2 Installation	Chapter 3 Operation	Chapter 4 Principles of Operation	Chapter 5		
				Org/Field Maintenance	Align- ment	Special Maintenance
Power Monitor Panel METER ASSEMBLY, ELECTRICAL ME-289A/MRC-85(V)2		f1, f5, t5	42	17, t2		
RADIO SET GROUP, OA-2990/FRC-39A(V) Parametric Amplifier REL 959	f3, t2	24, 25	22, f1			
RF Preselector REL S-2038 FILTER, TUNABLE, REJECTION F-789/MRC-98	t2					
SEMITRAILER, V-204/MRC-85(V) (Configurations A and B) Van only, U. S. Army Ordnance type M373A2 (modified)	24, 25, 78 80, f1, f2		52, 63, 68	11, 30, t1, t2, t3	80	80, t4
SIGNAL LINE EXTENSION Panel p/o Signal Line Extension Box CONNECTOR ASSEMBLY ELECTRICAL U-325A/MRC-85(V)2	f15, t2		30, 46	23		
Van only U. S. Army Ordnance Ordnance Type M373A2(modified) SEMITRAILER, V-204/MRC-85(V) (Configurations A and B)	24, 25, 78 80, f1, f2		52, 63, 68	11, 30, t1, t2, t3	80	80, t4



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